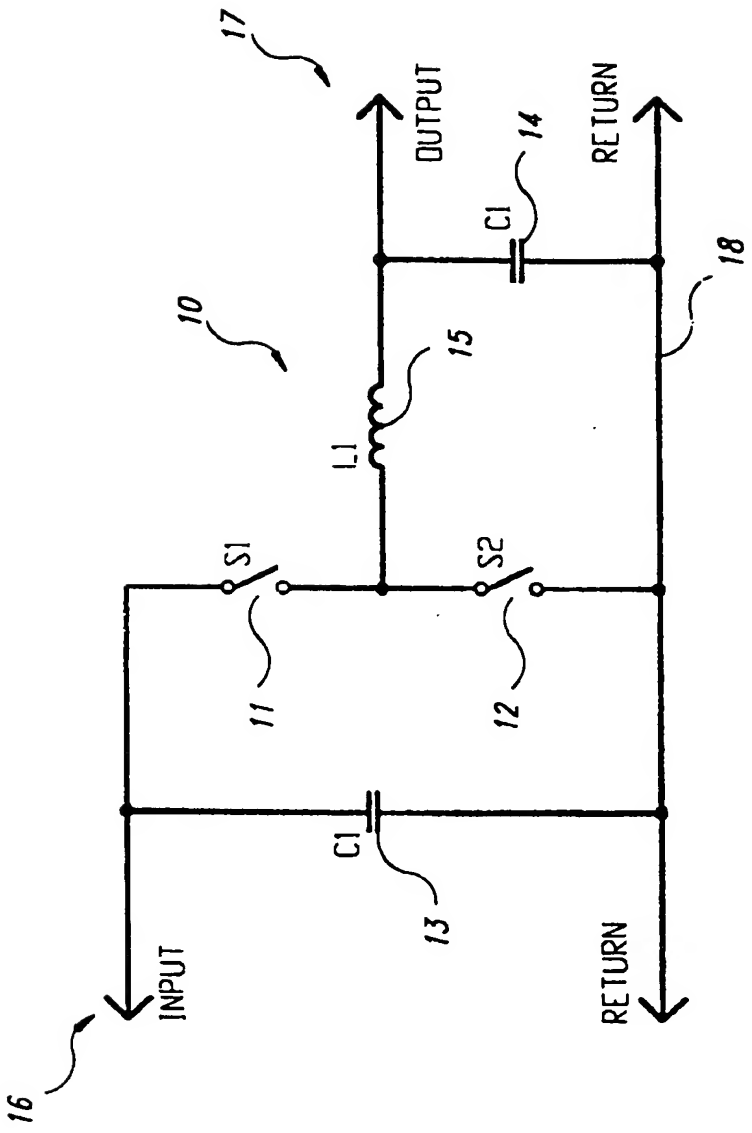


Fig. 1 (PRIOR ART)

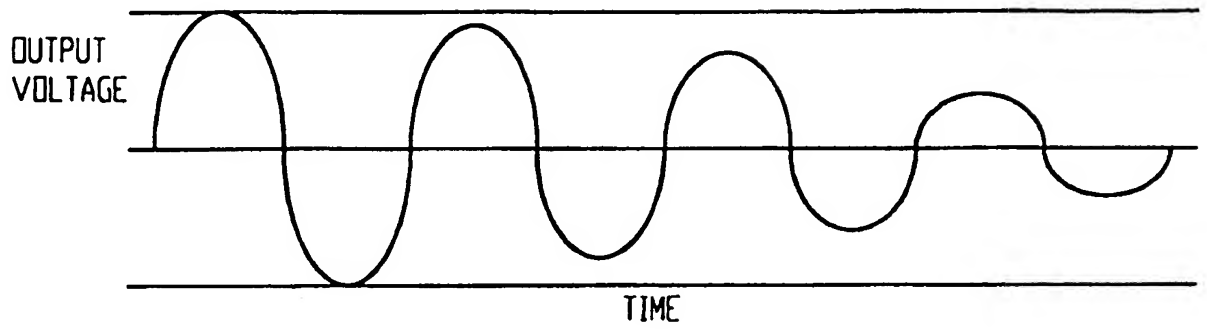


Fig. 3

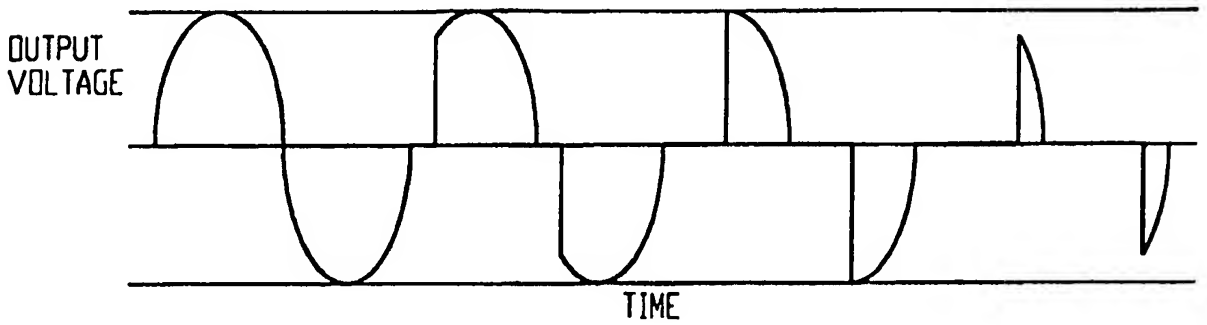


Fig. 2

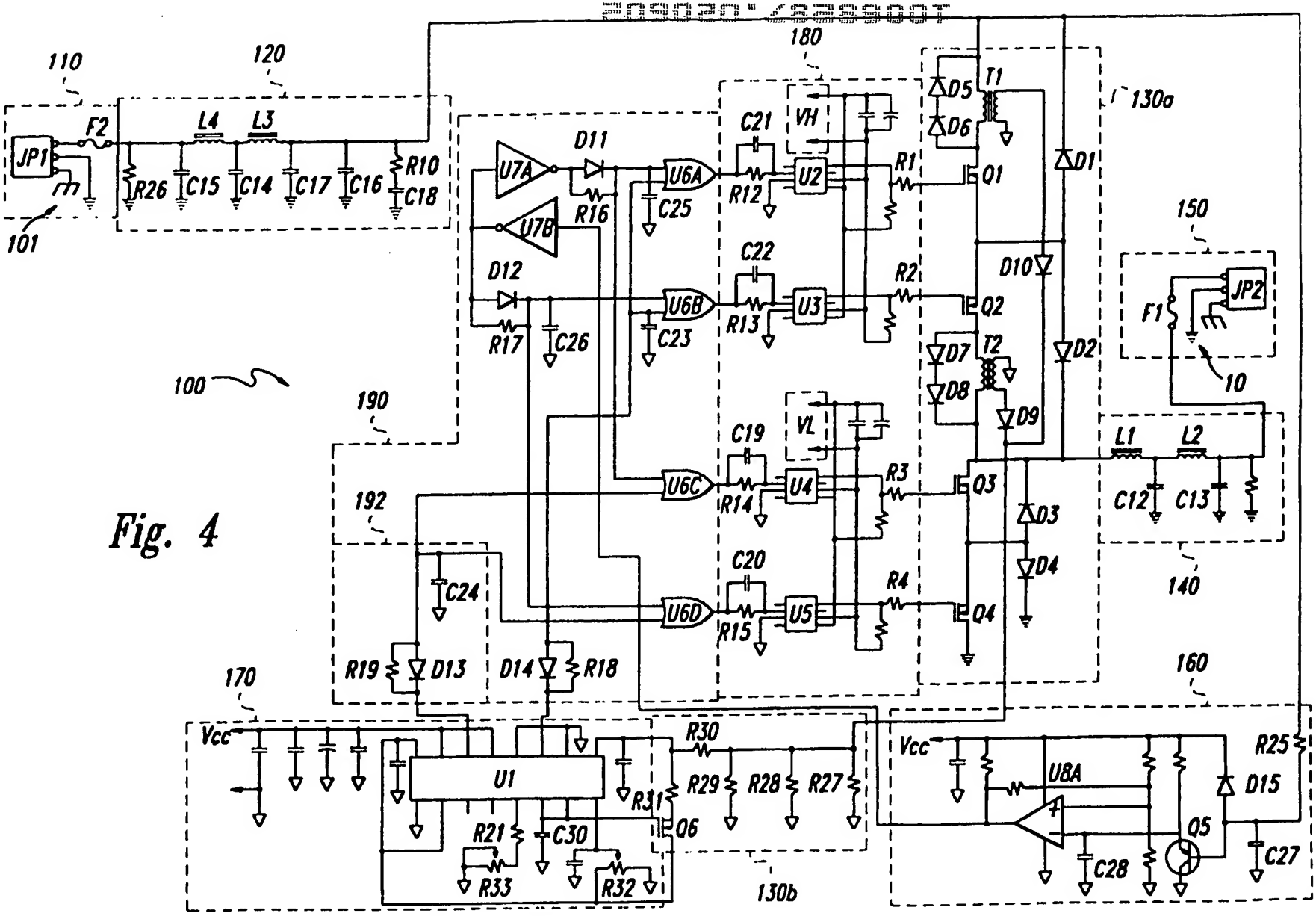

110
120
180
130a
JP1
F2
L4
L3
R26
C15
C14
C17
C16
R10
C18
101
U7A
U7B
D11
R16
U6A
C25
C21
VH
R12
U2
R1
Q1
D5
D6
T1
D1
D12
R17
C26
U6B
C23
C22
R13
U3
R2
Q2
D10
D2
D7
D8
T2
D9
150
JP2
F1
10
100
190
C19
VL
U6C
R14
U4
R3
Q3
D3
L1
L2
C12
C13
192
C24
U6D
R15
U5
R4
Q4
D4
140
R19
D13
D14
R18
170
160
Vcc
U1
R30
R29
R28
R27
R31
Q6
R21
C30
R33
R32
130b
U8A
R25
D15
Q5
C28
C27

Fig. 4

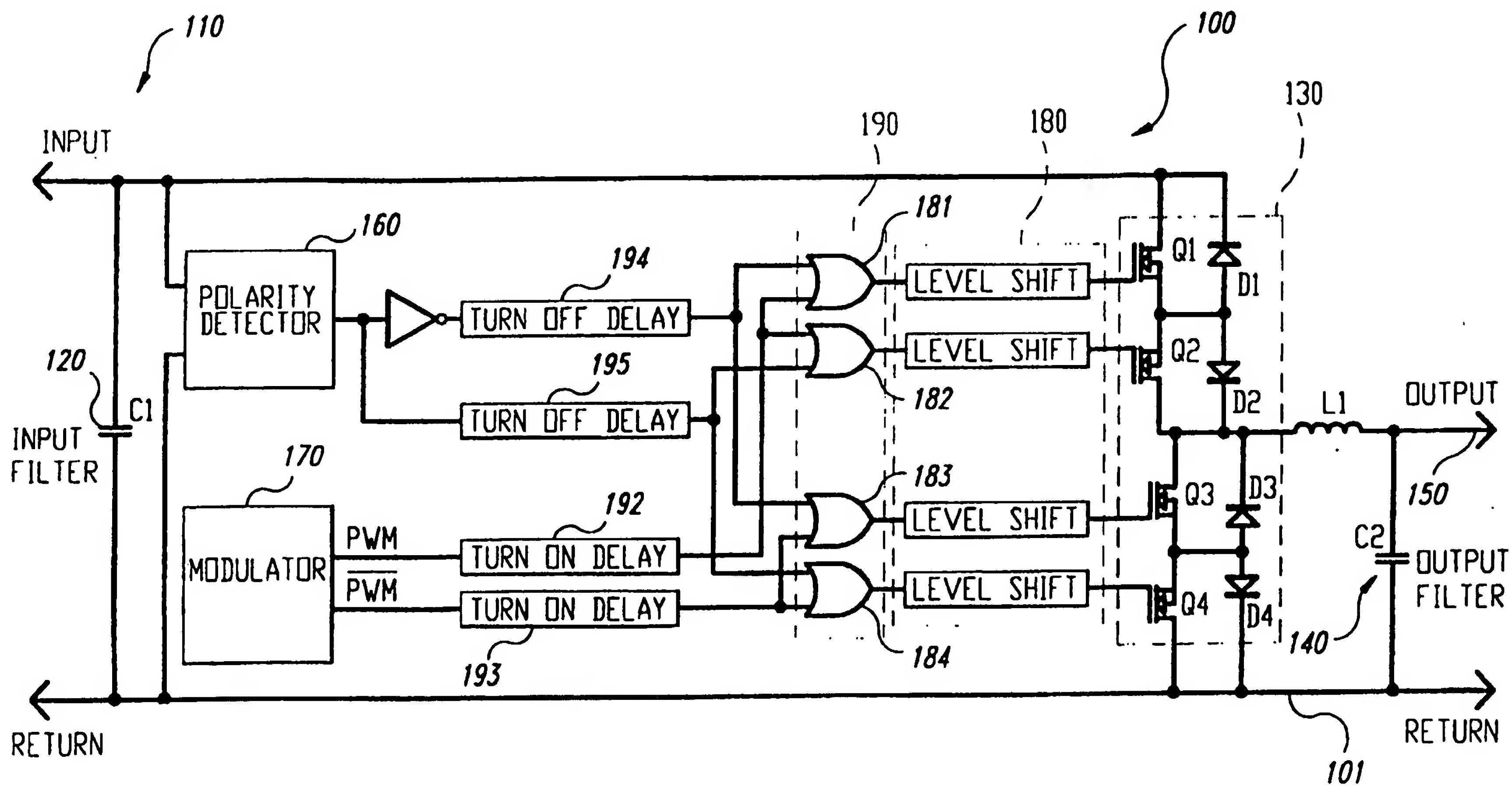

110
100
INPUT
190
180
130
181
160
POLARITY
DETECTOR
194
Q1
D1
LEVEL SHIFT
TURN OFF DELAY
Q2
LEVEL SHIFT
195
182
D2
L1
OUTPUT
120
C1
INPUT
FILTER
TURN OFF DELAY
170
183
Q3
D3
150
PWM
192
LEVEL SHIFT
MODULATOR
TURN ON DELAY
C2
OUTPUT
FILTER
PWM
TURN ON DELAY
LEVEL SHIFT
Q4
D4
140
193
184
RETURN
RETURN
101

Fig. 5

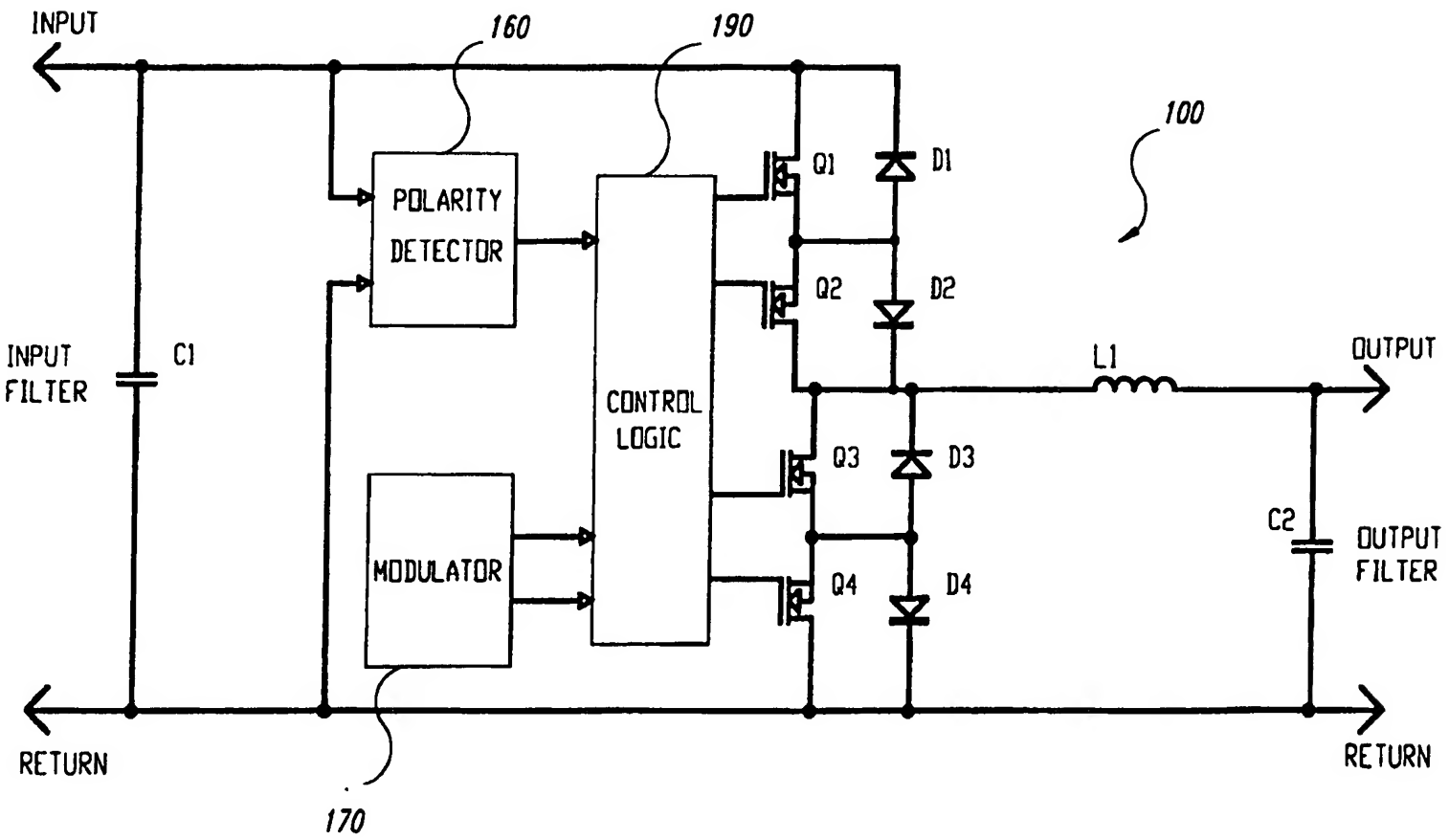

INPUT
160
190
100
POLARITY
DETECTOR
Q1
D1
Q2
D2
INPUT
FILTER
C1
CONTROL
LOGIC
L1
OUTPUT
Q3
D3
C2
OUTPUT
FILTER
MODULATOR
Q4
D4
RETURN
RETURN
170

Fig. 6A

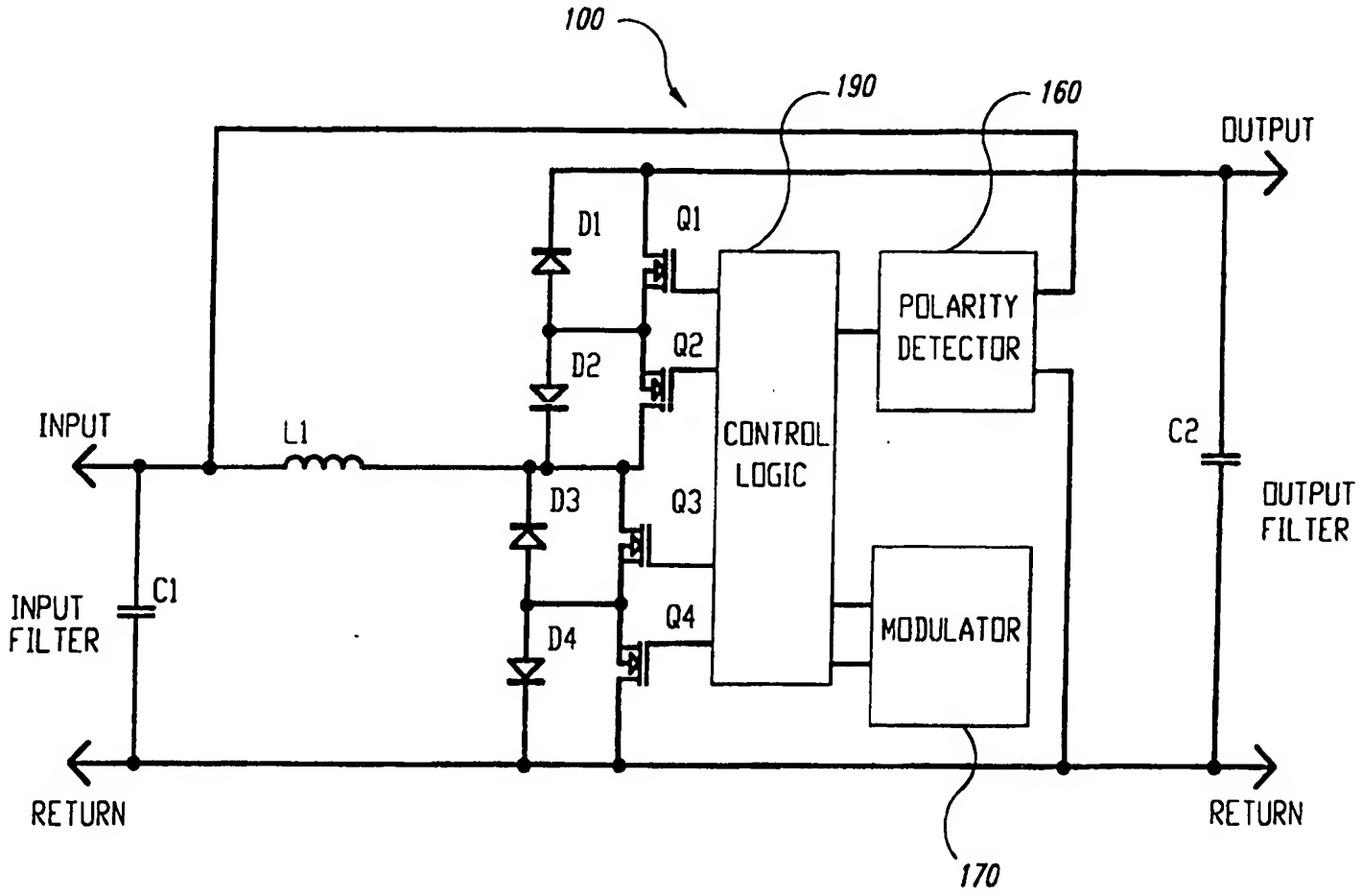

100
190
160
OUTPUT
D1
Q1
POLARITY
DETECTOR
Q2
D2
INPUT
L1
CONTROL
LOGIC
C2
D3
Q3
OUTPUT
FILTER
C1
INPUT
FILTER
Q4
D4
MODULATOR
RETURN
RETURN
170

Fig. 6B

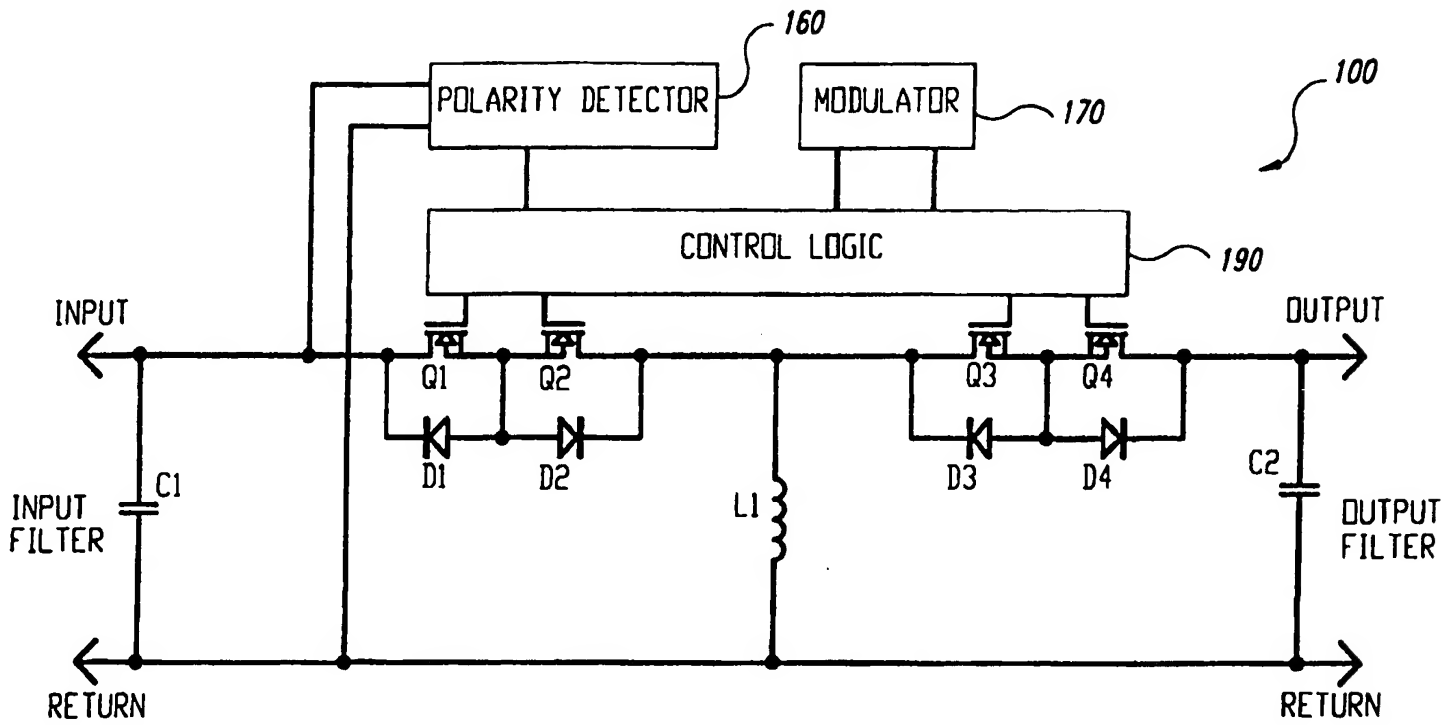
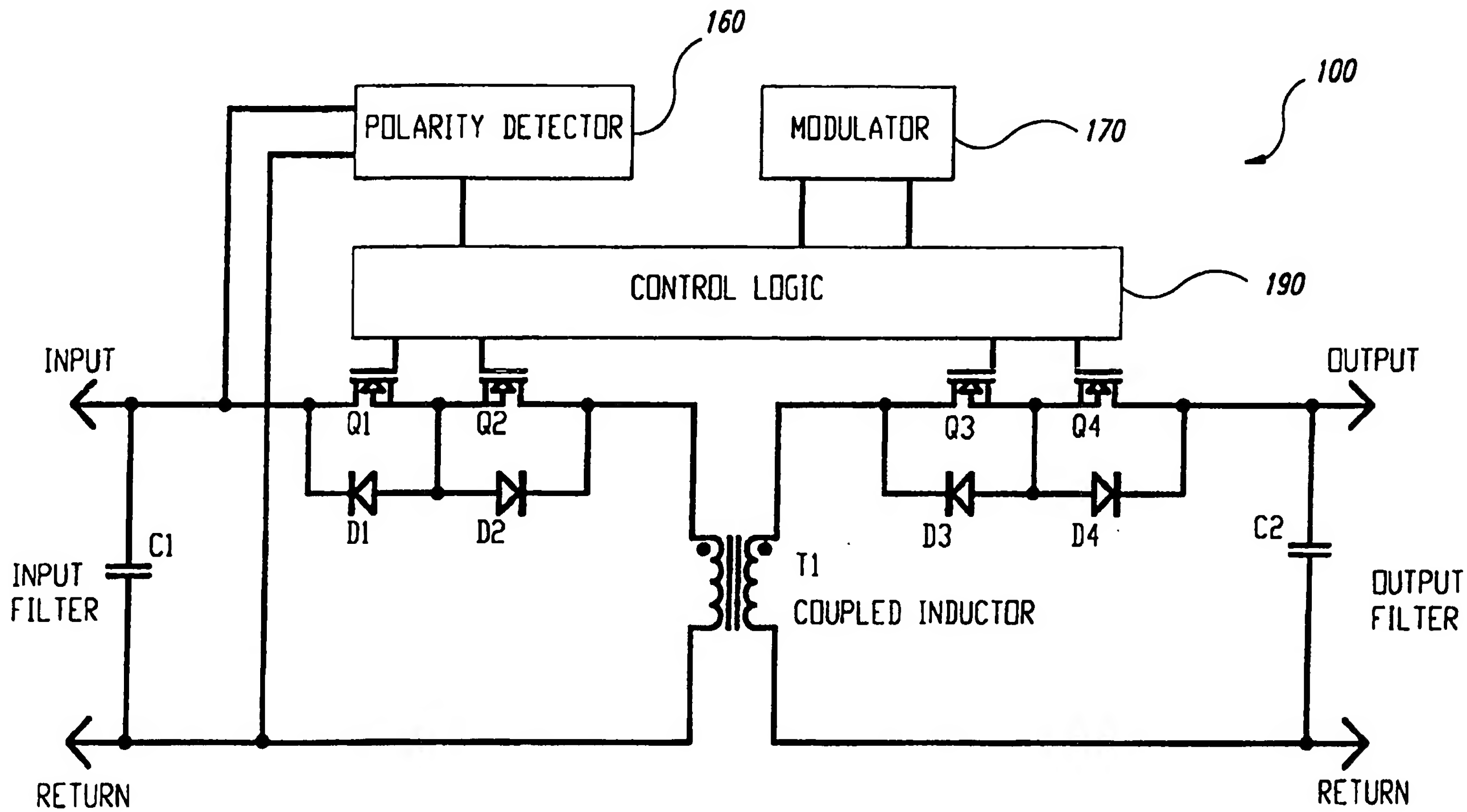

160
POLARITY DETECTOR
MODULATOR
170
100
CONTROL LOGIC
190
INPUT
OUTPUT
Q1
Q2
Q3
Q4
D1
D2
D3
D4
C1
C2
L1
INPUT
FILTER
OUTPUT
FILTER
RETURN
RETURN

Fig. 6C



160
100
POLARITY DETECTOR
MODULATOR
170
CONTROL LOGIC
190
INPUT
OUTPUT
Q1
Q2
Q3
Q4
D1
D2
D3
D4
C1
C2
INPUT
FILTER
T1
COUPLED INDUCTOR
OUTPUT
FILTER
RETURN
RETURN

Fig. 6D

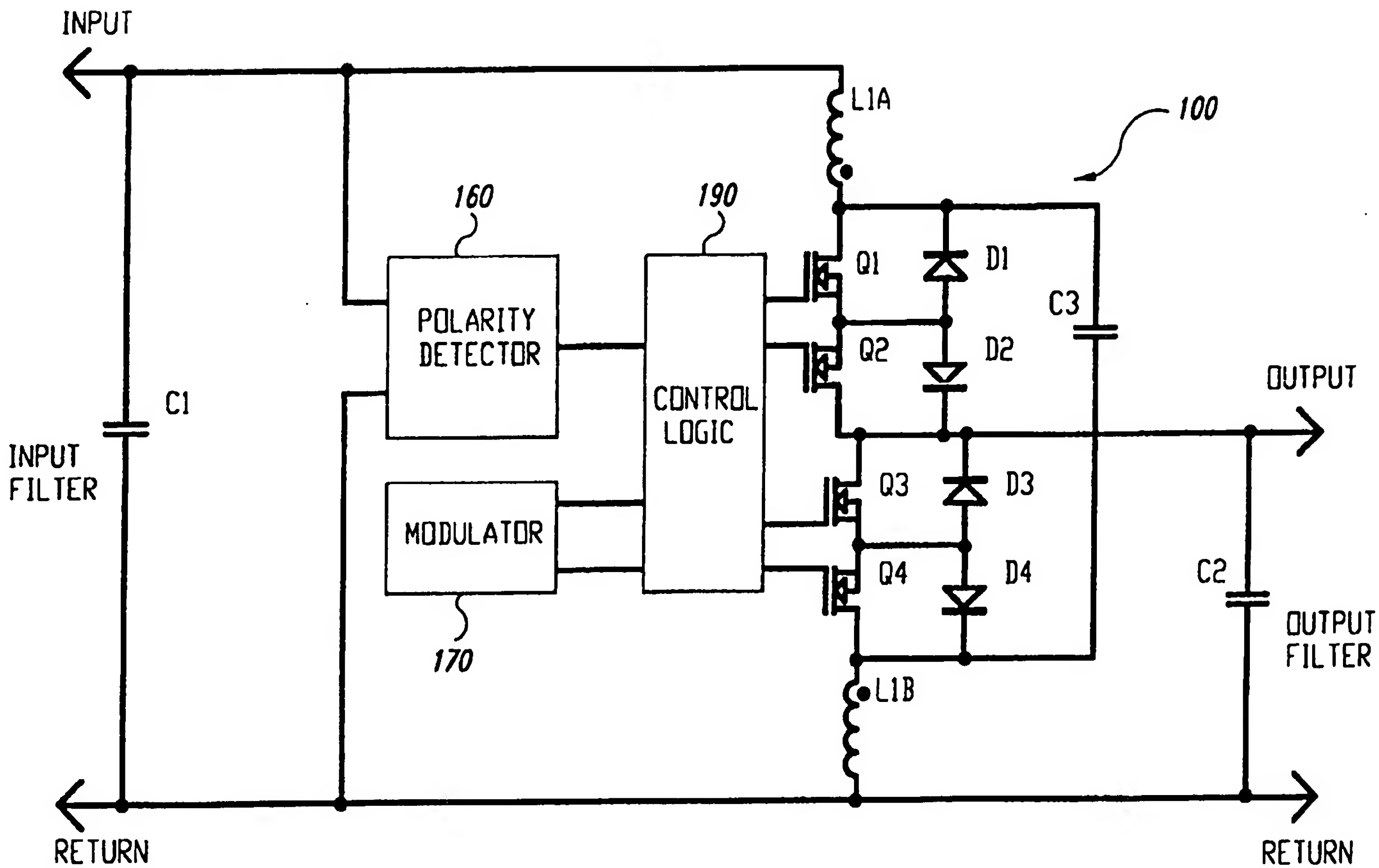

INPUT
RETURN
INPUT
FILTER
C1
160
POLARITY
DETECTOR
MODULATOR
170
190
CONTROL
LOGIC
L1A
100
Q1
D1
Q2
D2
C3
Q3
D3
Q4
D4
L1B
OUTPUT
C2
OUTPUT
FILTER
RETURN

Fig. 7A

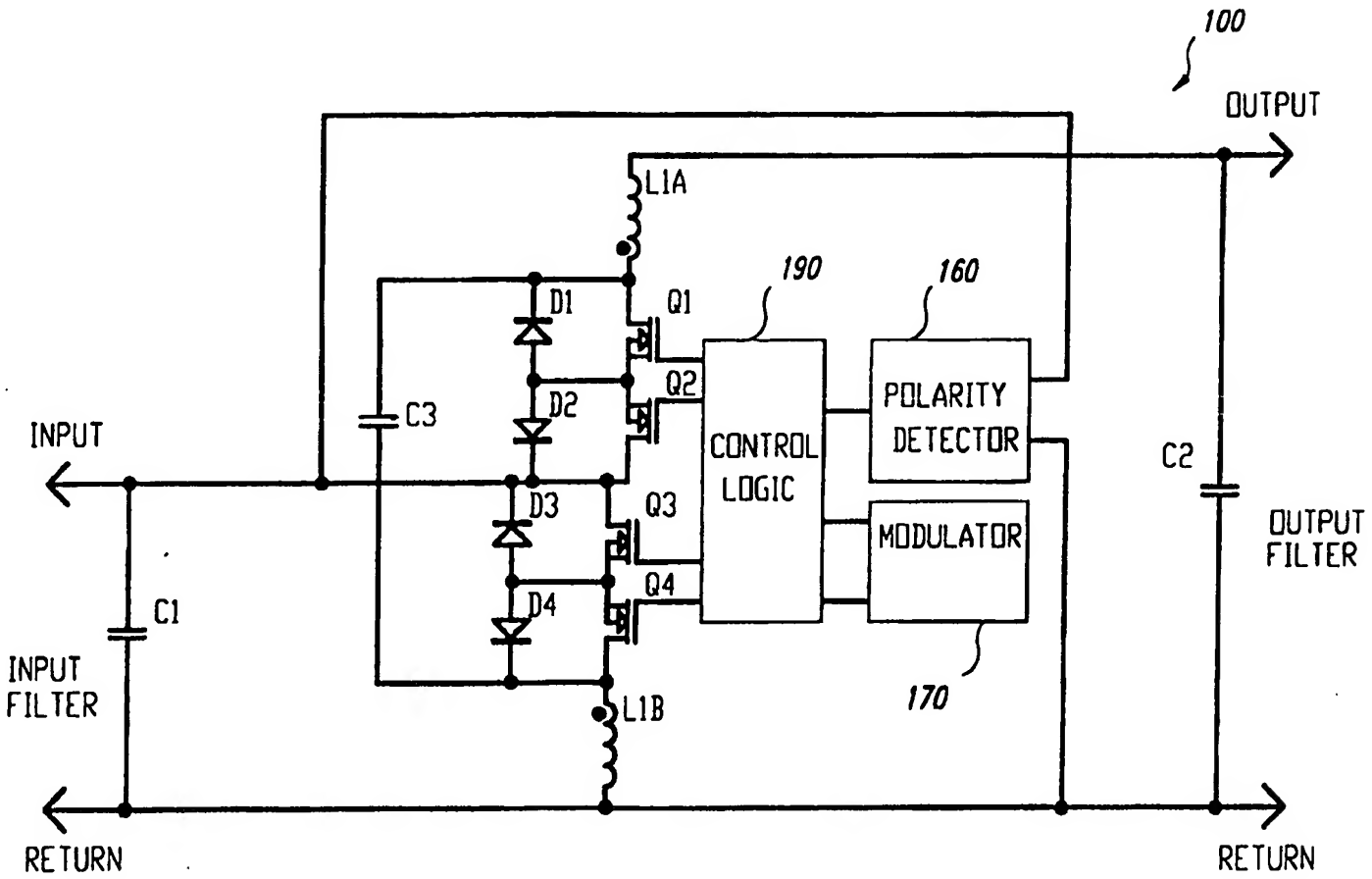

100
OUTPUT
L1A
190
160
D1
Q1
Q2
D2
C3
INPUT
CONTROL
LOGIC
POLARITY
DETECTOR
C2
D3
Q3
MODULATOR
OUTPUT
FILTER
Q4
D4
C1
INPUT
FILTER
170
L1B
RETURN
RETURN

Fig. 7B

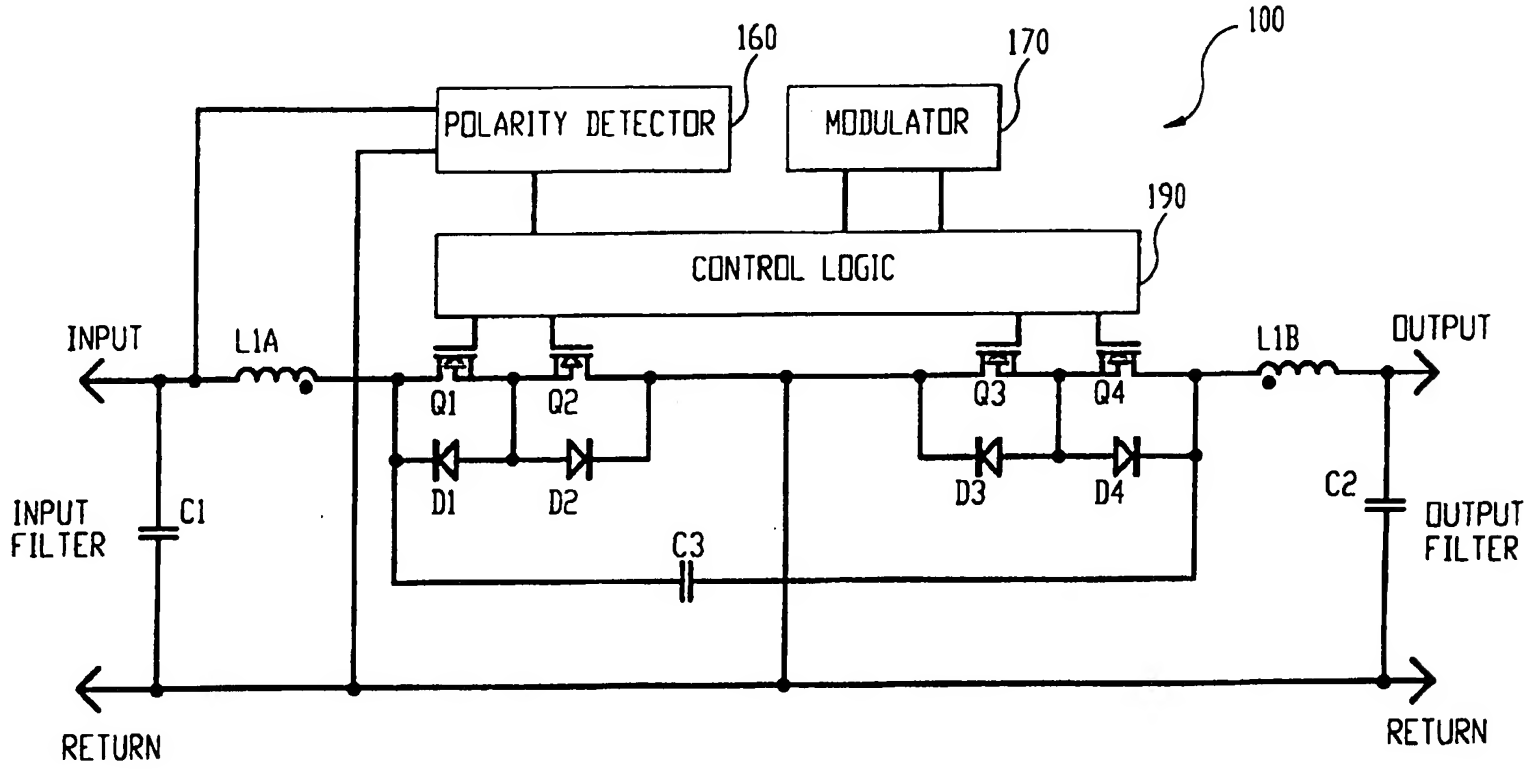


Fig. 7C

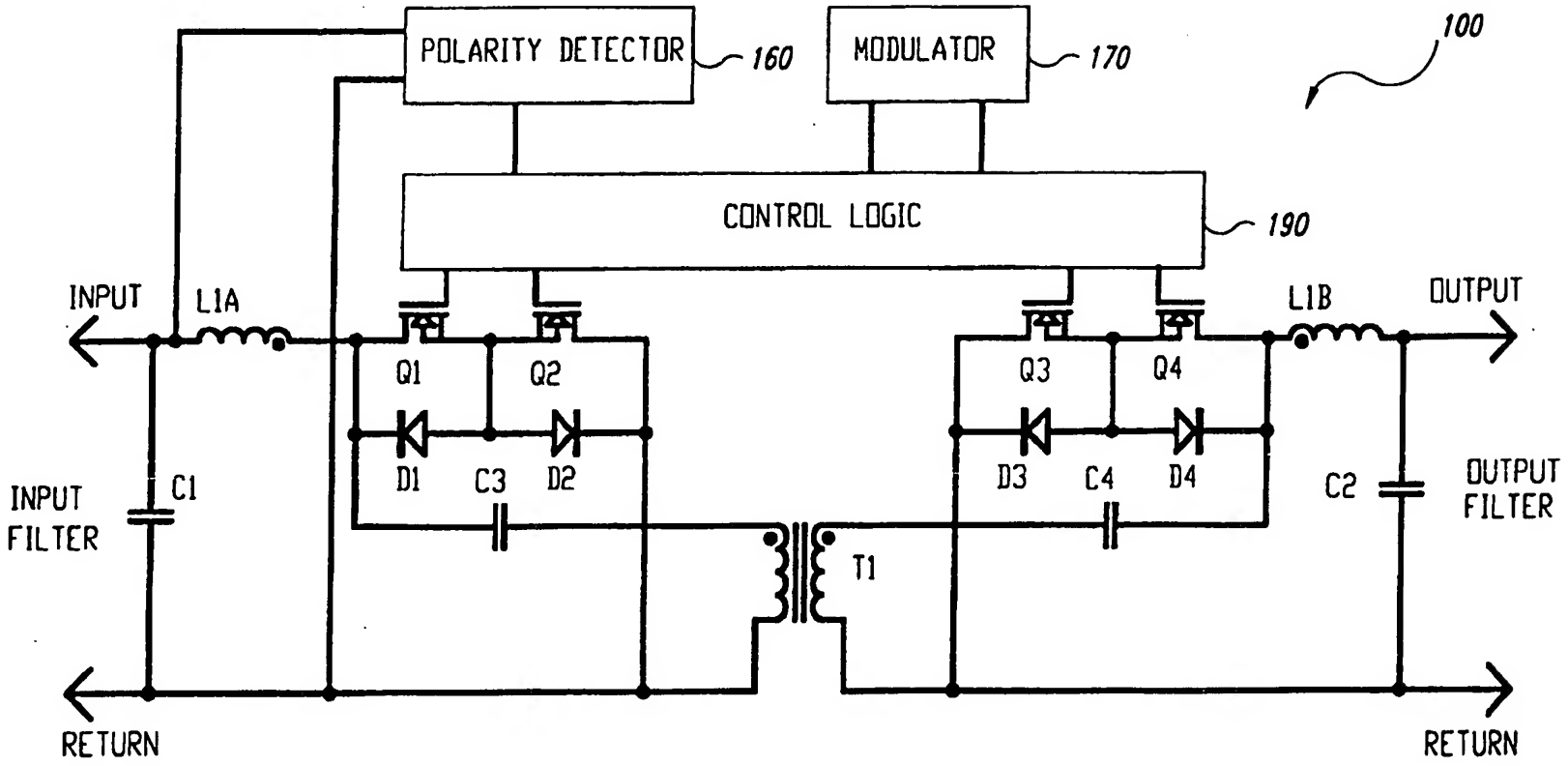

POLARITY DETECTOR
160
MODULATOR
170
100
CONTROL LOGIC
190
INPUT
L1A
L1B
OUTPUT
Q1
Q2
Q3
Q4
D1
C3
D2
D3
C4
D4
C2
INPUT
FILTER
C1
OUTPUT
FILTER
T1
RETURN
RETURN

Fig. 7D

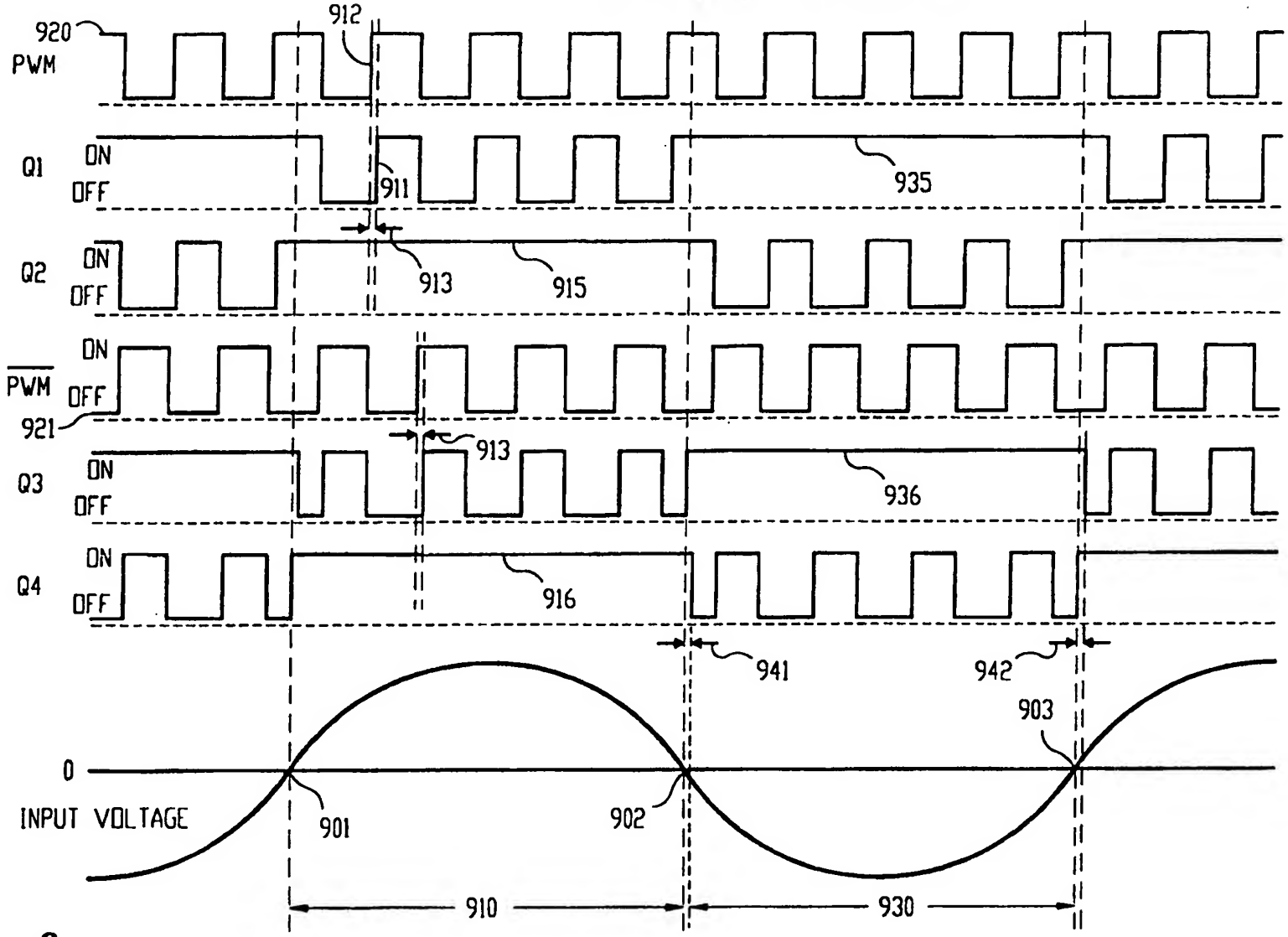

920
PWM
912
Q1
ON
OFF
911
935
Q2
ON
OFF
913
915
PWM
ON
OFF
921
913
Q3
ON
OFF
936
Q4
ON
OFF
916
941
942
903
0
INPUT VOLTAGE
901
902
910
930

Fig. 8

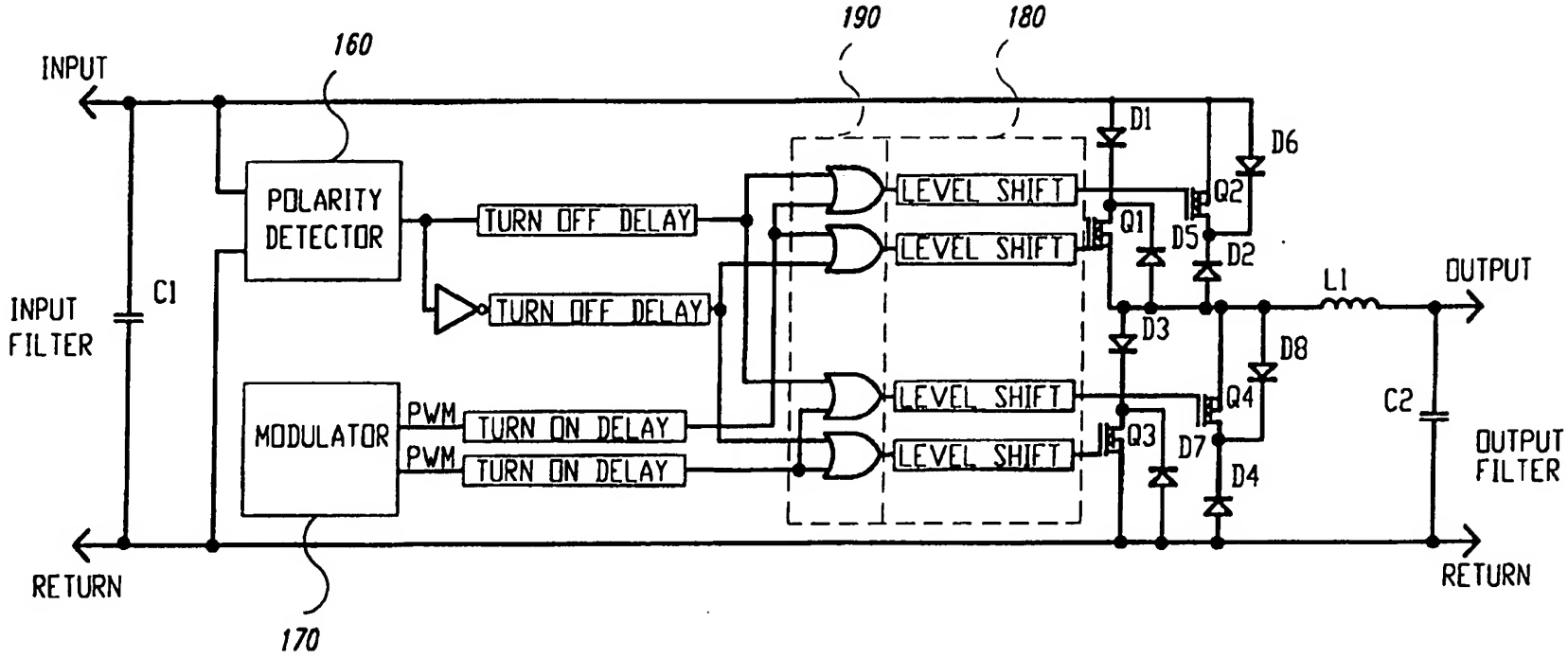

INPUT
160
190
180
POLARITY DETECTOR
TURN OFF DELAY
TURN OFF DELAY
LEVEL SHIFT
LEVEL SHIFT
D1
D6
Q2
Q1
D5
D2
INPUT FILTER
C1
L1
OUTPUT
D3
D8
MODULATOR
PWM
TURN ON DELAY
PWM
TURN ON DELAY
LEVEL SHIFT
LEVEL SHIFT
Q4
Q3
D7
D4
C2
OUTPUT FILTER
RETURN
RETURN
170

Fig. 9

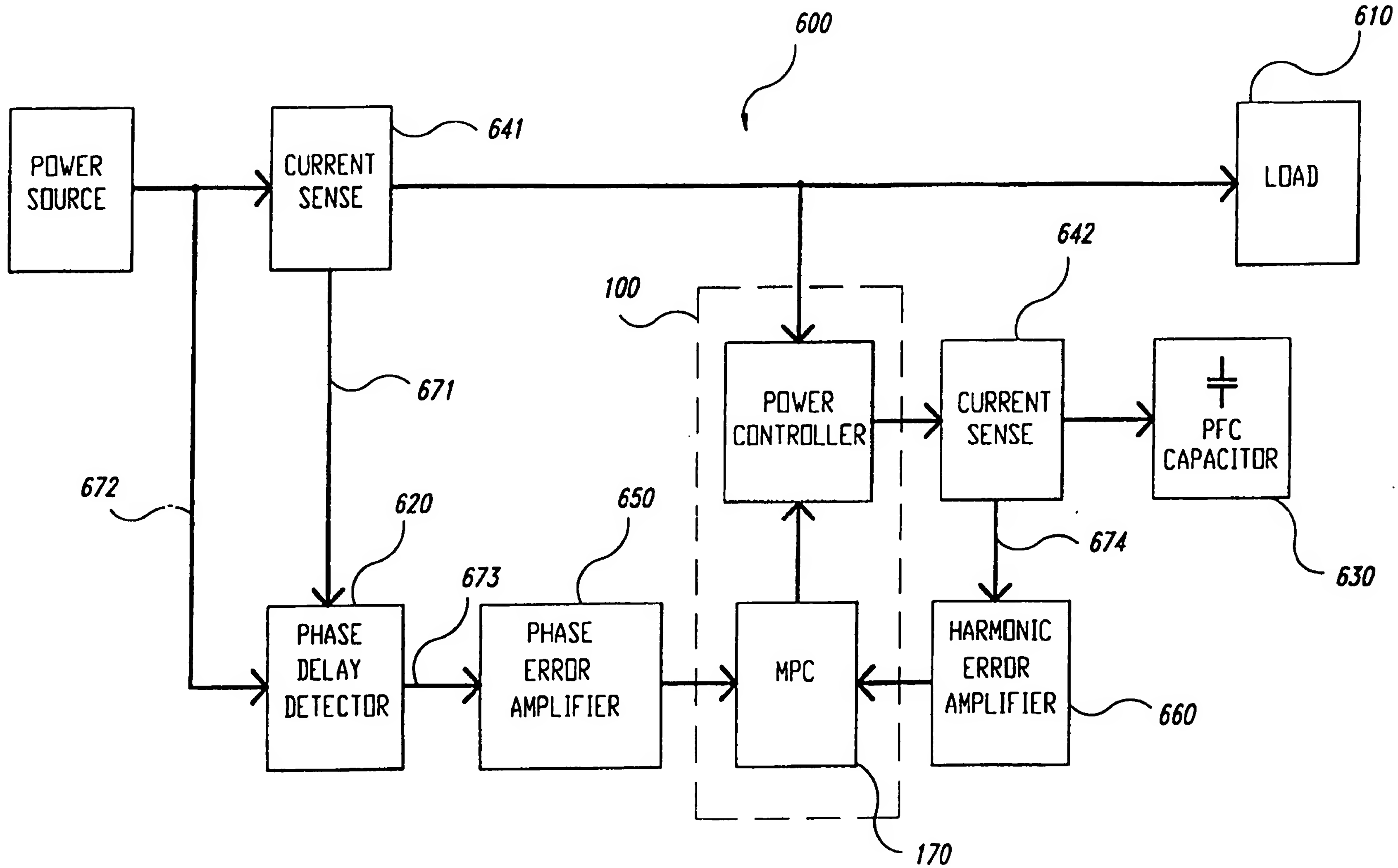

600
610
POWER SOURCE
CURRENT SENSE
641
LOAD
642
100
671
POWER CONTROLLER
CURRENT SENSE
PFC CAPACITOR
672
620
650
674
630
673
PHASE DELAY DETECTOR
PHASE ERROR AMPLIFIER
MPC
HARMONIC ERROR AMPLIFIER
660
170

Fig. 10

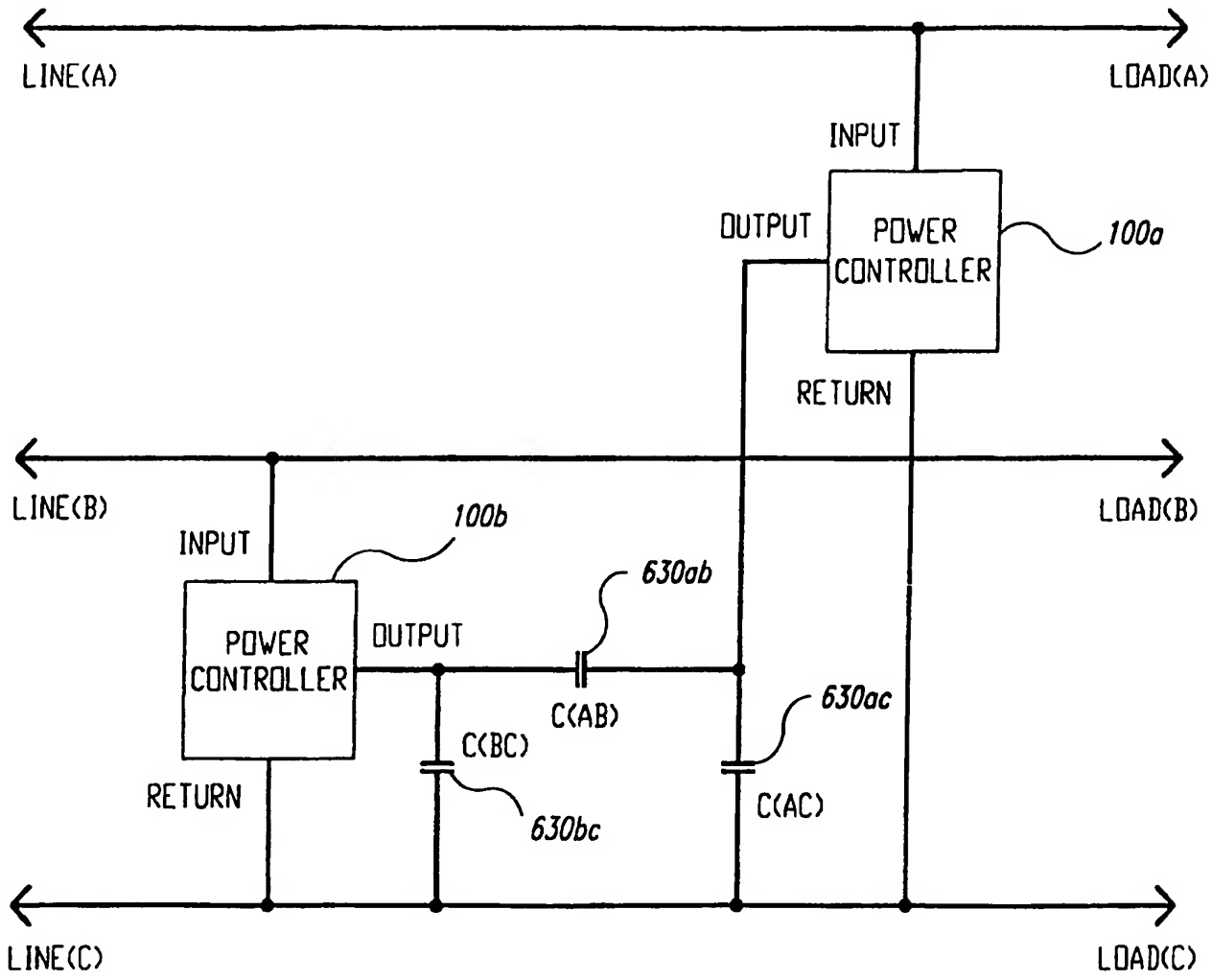

LINE(A)
LOAD(A)
INPUT
OUTPUT
POWER CONTROLLER
100a
RETURN
LINE(B)
LOAD(B)
INPUT
100b
630ab
POWER CONTROLLER
OUTPUT
C(AB)
630ac
C(BC)
RETURN
630bc
C(AC)
LINE(C)
LOAD(C)

Fig. 11

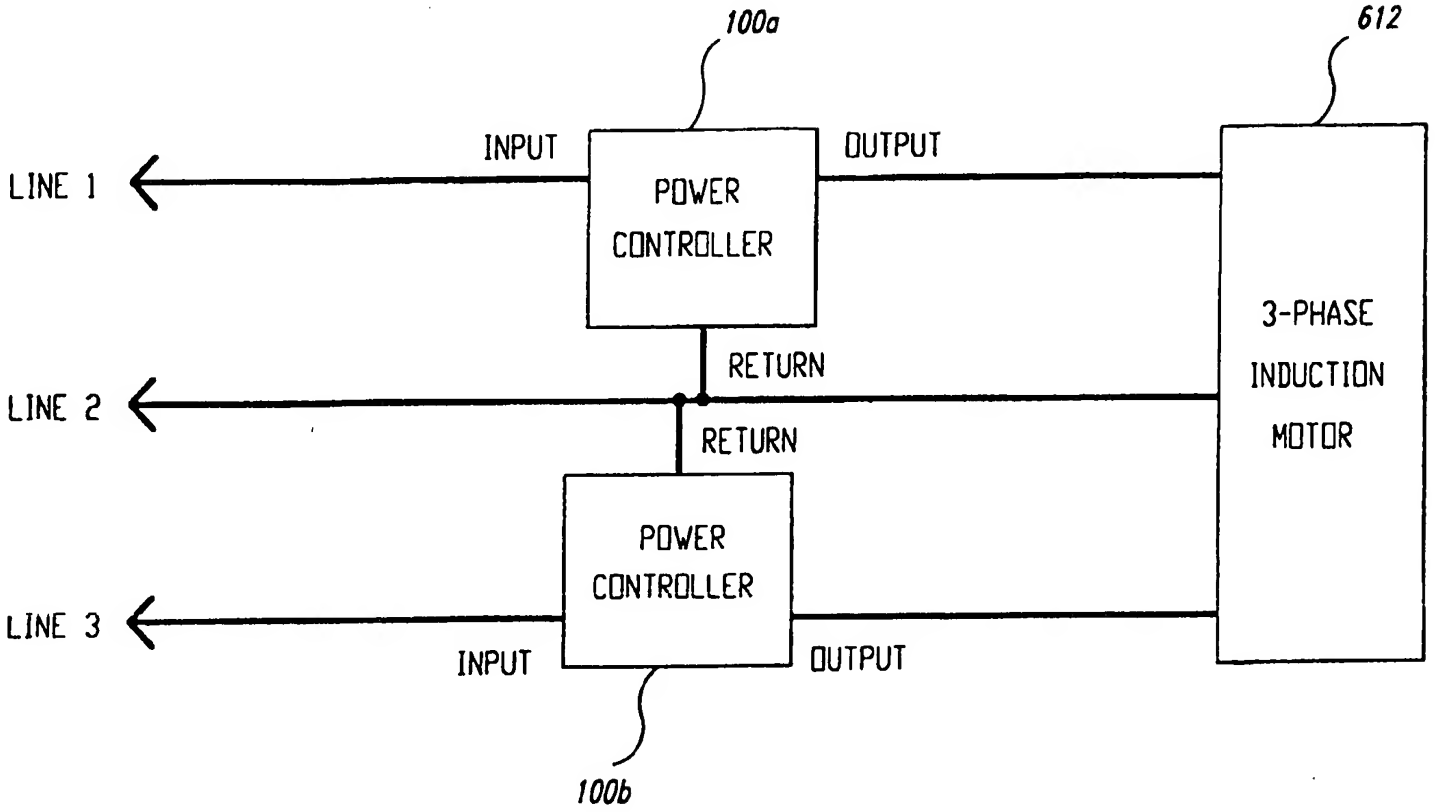

100a
612
INPUT
OUTPUT
LINE 1
POWER
CONTROLLER
3-PHASE
INDUCTION
MOTOR
RETURN
LINE 2
RETURN
POWER
CONTROLLER
LINE 3
INPUT
OUTPUT
100b

Fig. 12

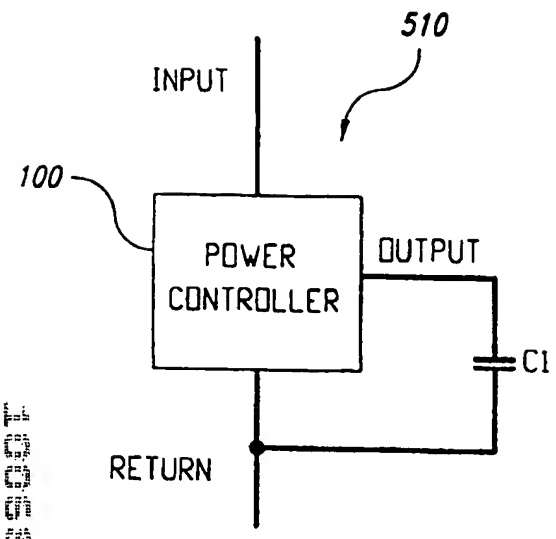


Fig. 13

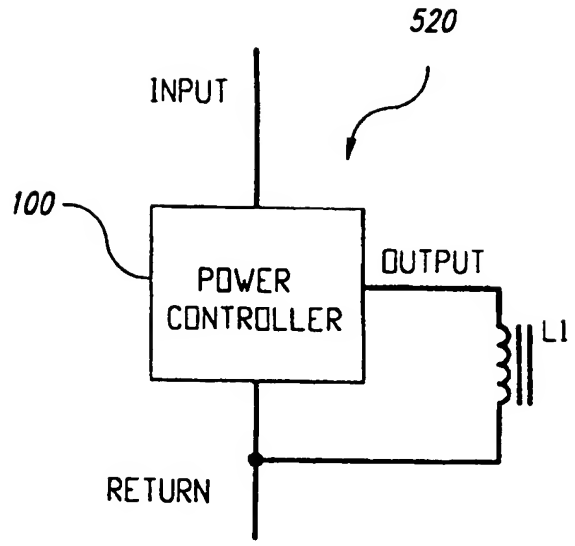


Fig. 14

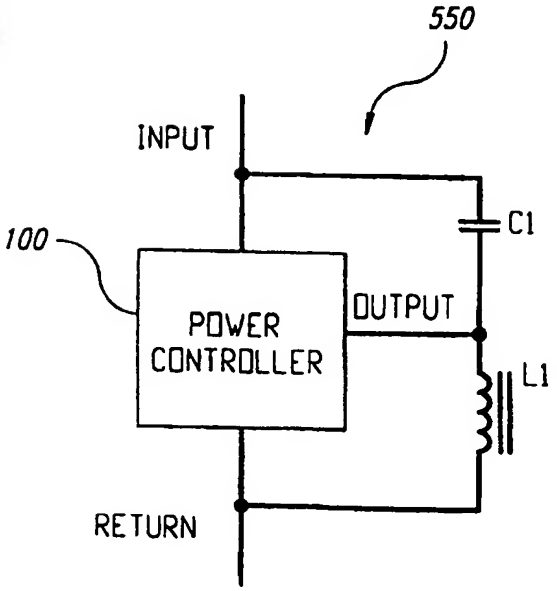


Fig. 15

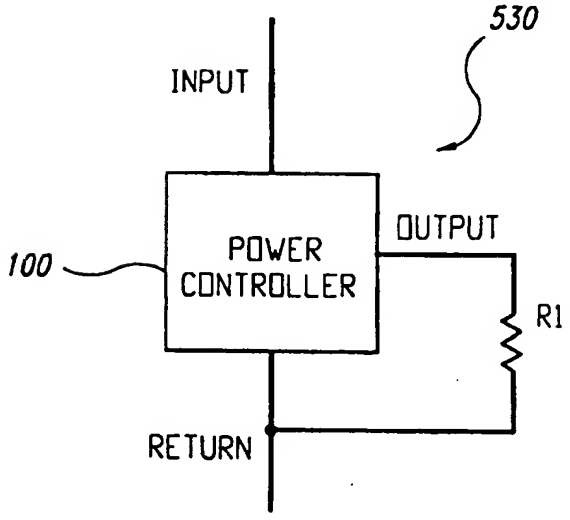


Fig. 16

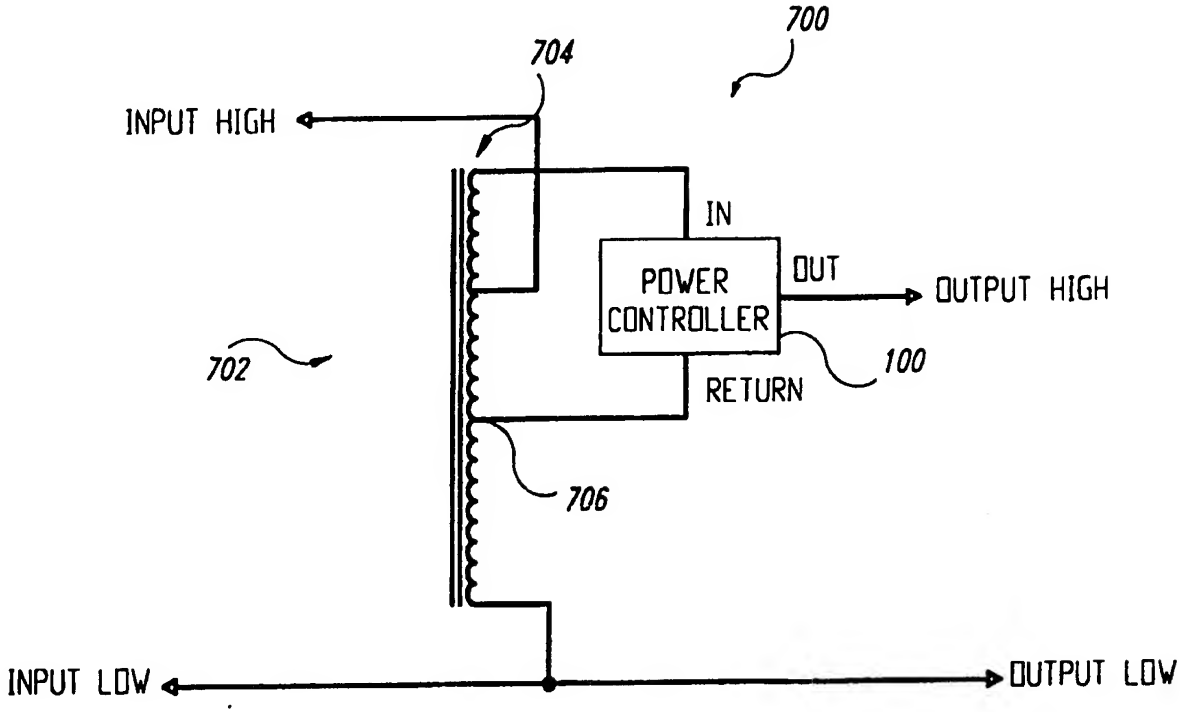


Fig. 17

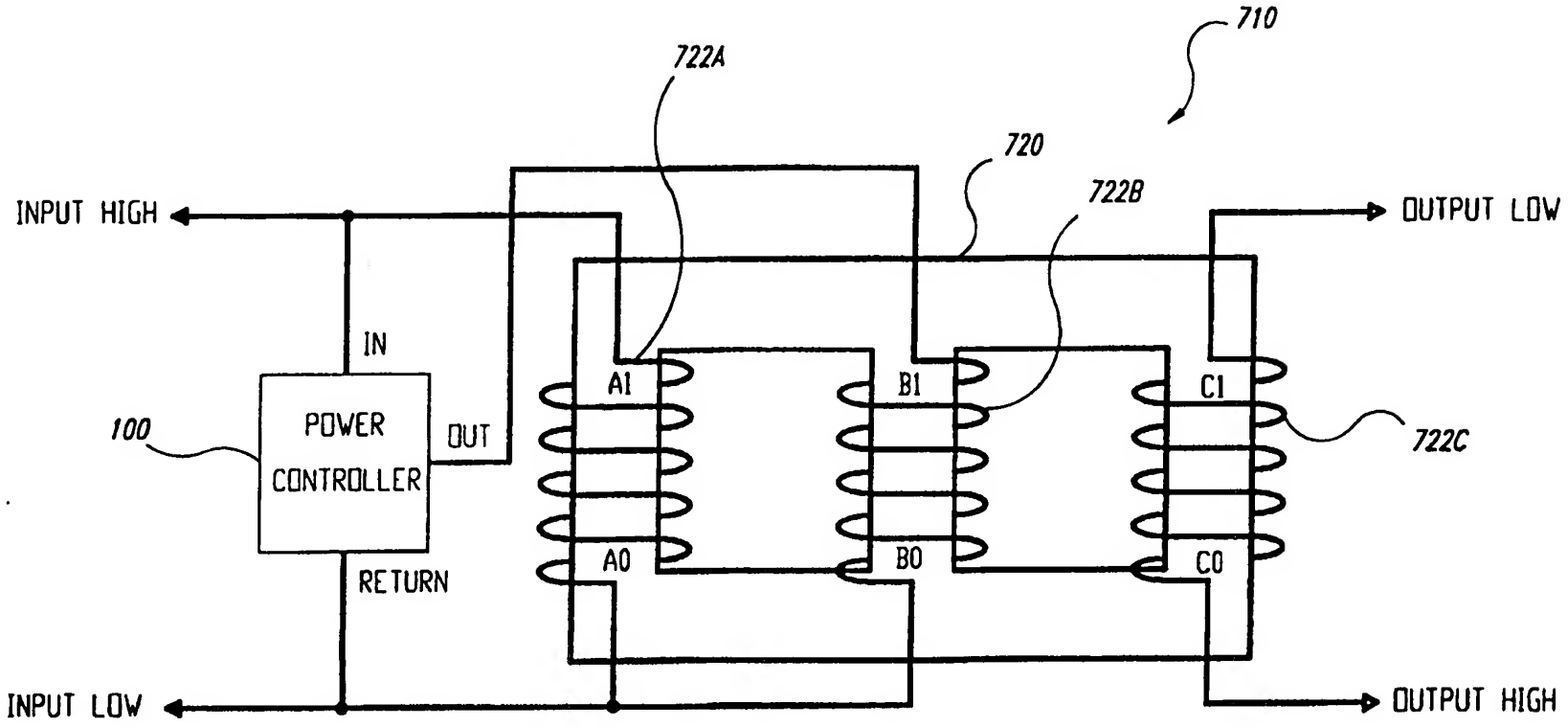


Fig. 18

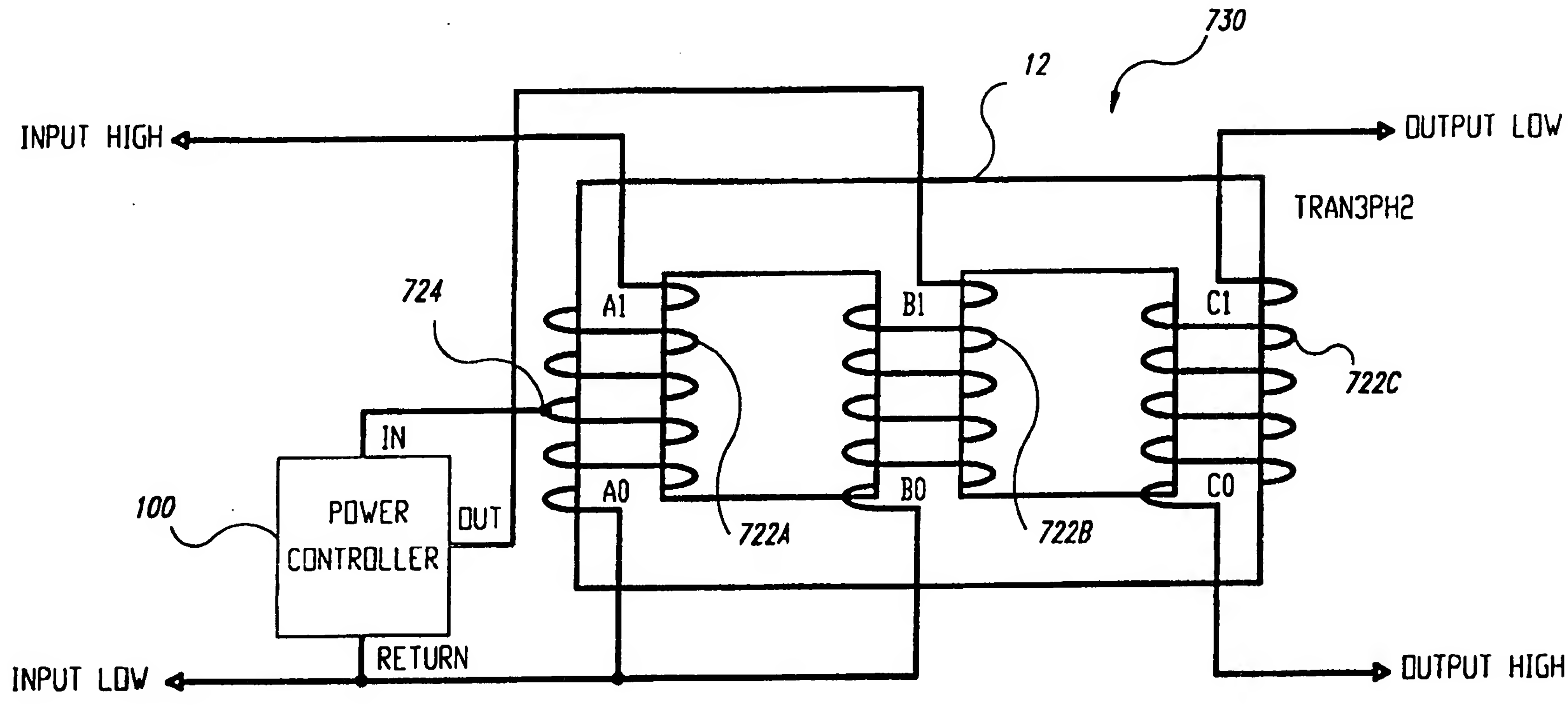

730
12
INPUT HIGH
OUTPUT LOW
TRAN3PH2
724
A1
B1
C1
722C
IN
POWER
CONTROLLER
OUT
100
A0
B0
C0
722A
722B
RETURN
INPUT LOW
OUTPUT HIGH

Fig. 19

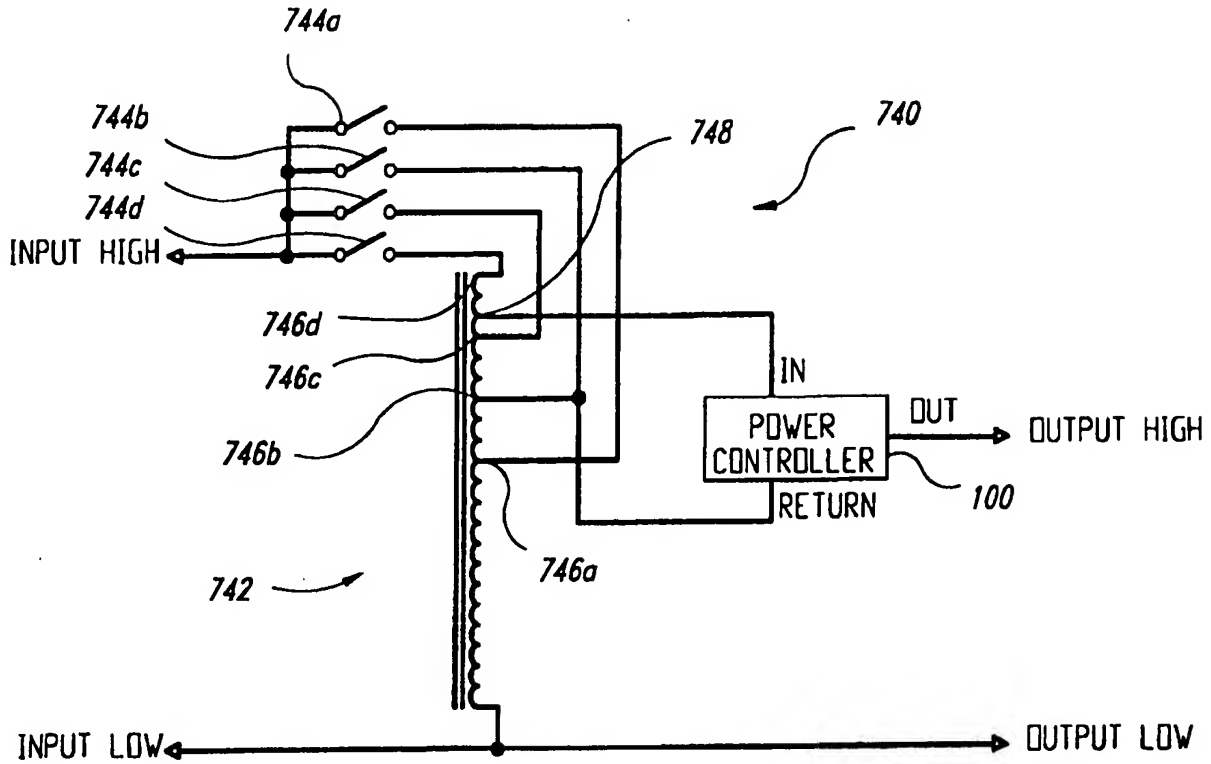

744a
744b
744c
744d
INPUT HIGH
748
740
746d
746c
746b
746a
742
IN
POWER CONTROLLER
OUT
RETURN
100
OUTPUT HIGH
INPUT LOW
OUTPUT LOW

Fig. 20

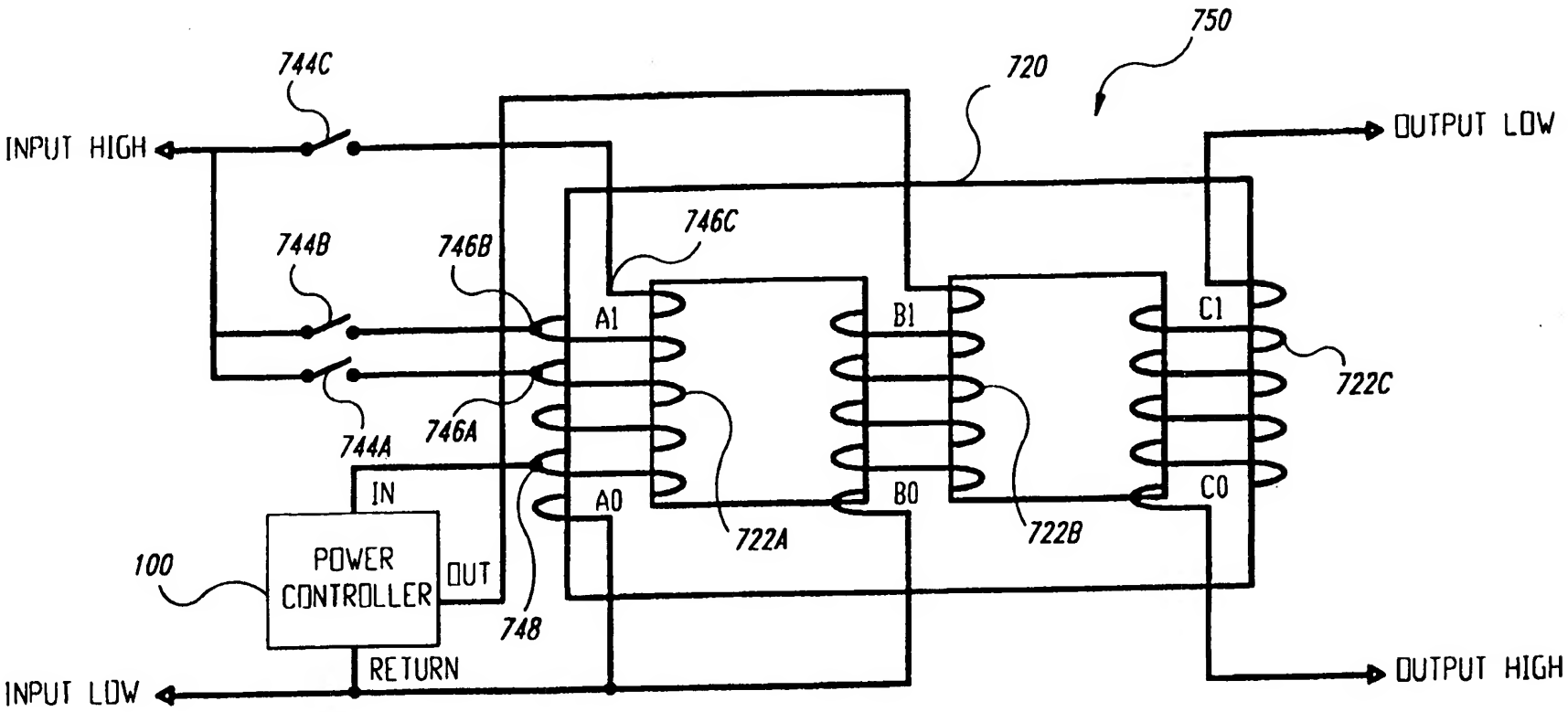

750
744C
720
INPUT HIGH
OUTPUT LOW
744B
746B
746C
A1
B1
C1
722C
744A
746A
IN
A0
B0
C0
722A
722B
100
POWER CONTROLLER
OUT
748
RETURN
INPUT LOW
OUTPUT HIGH

Fig. 21

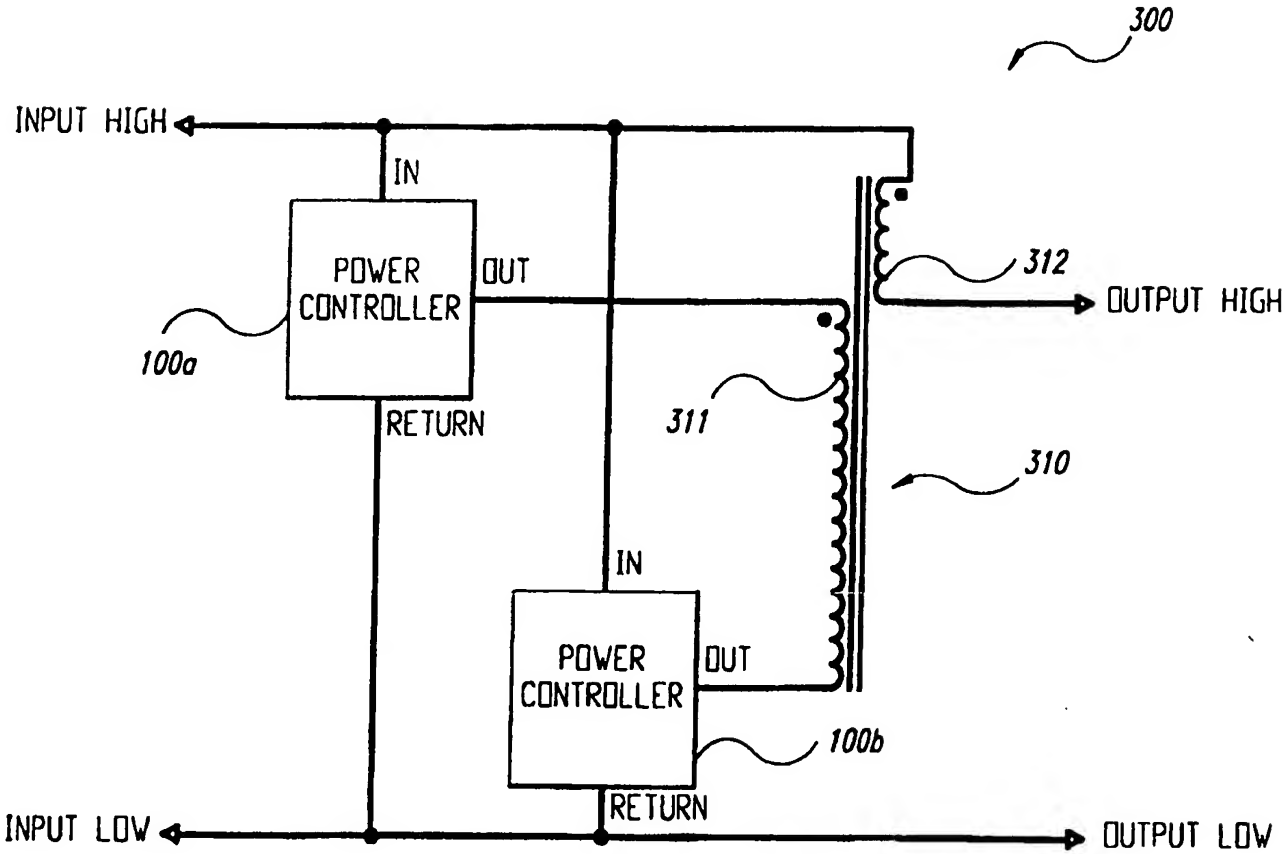

300
INPUT HIGH
IN
POWER CONTROLLER
OUT
100a
RETURN
312
OUTPUT HIGH
311
310
IN
POWER CONTROLLER
OUT
100b
RETURN
INPUT LOW
OUTPUT LOW

Fig. 22

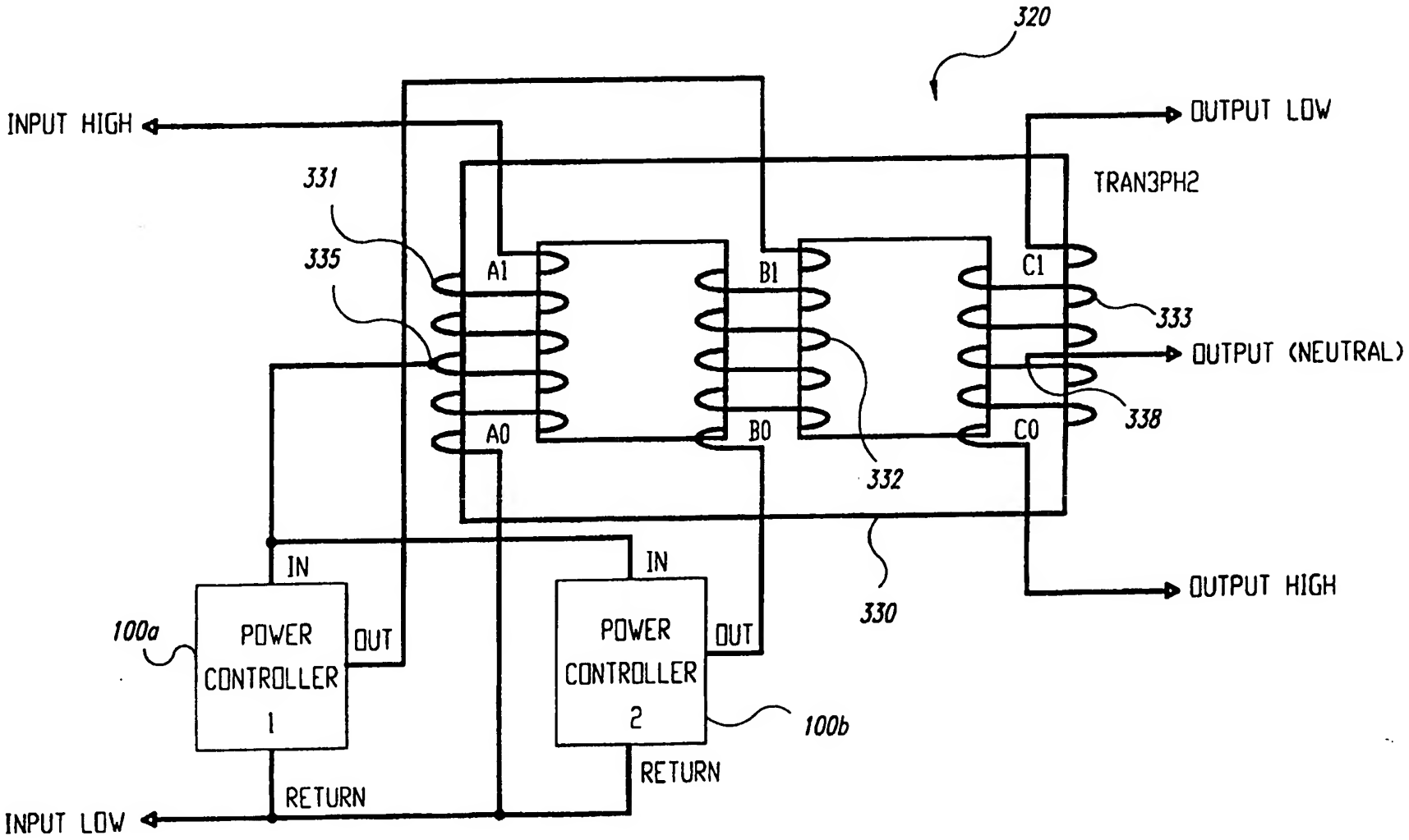

320
INPUT HIGH
OUTPUT LOW
TRAN3PH2
331
335
A1
B1
C1
333
OUTPUT (NEUTRAL)
338
A0
B0
C0
332
330
OUTPUT HIGH
IN
IN
100a
POWER CONTROLLER 1
OUT
POWER CONTROLLER 2
OUT
100b
RETURN
RETURN
INPUT LOW

Fig. 23

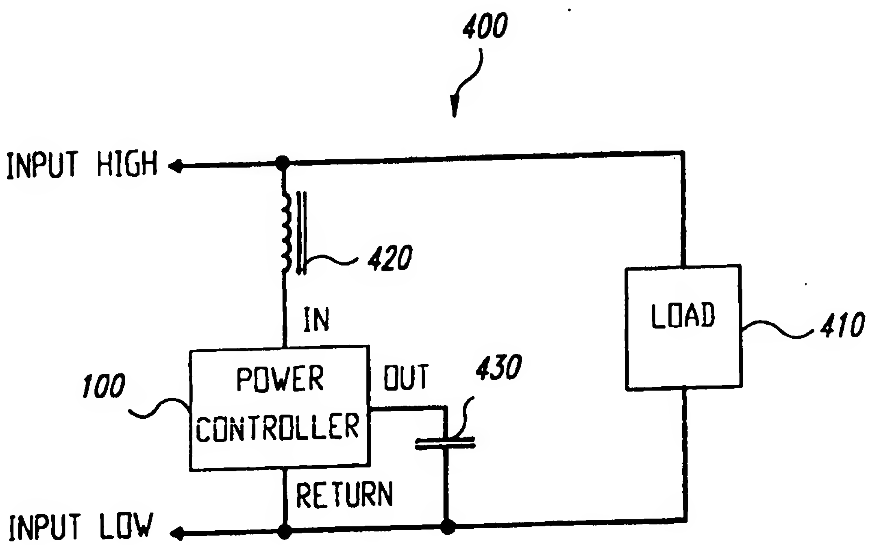

400
INPUT HIGH
420
IN
POWER
CONTROLLER
OUT
430
RETURN
100
INPUT LOW
LOAD
410

Fig. 24

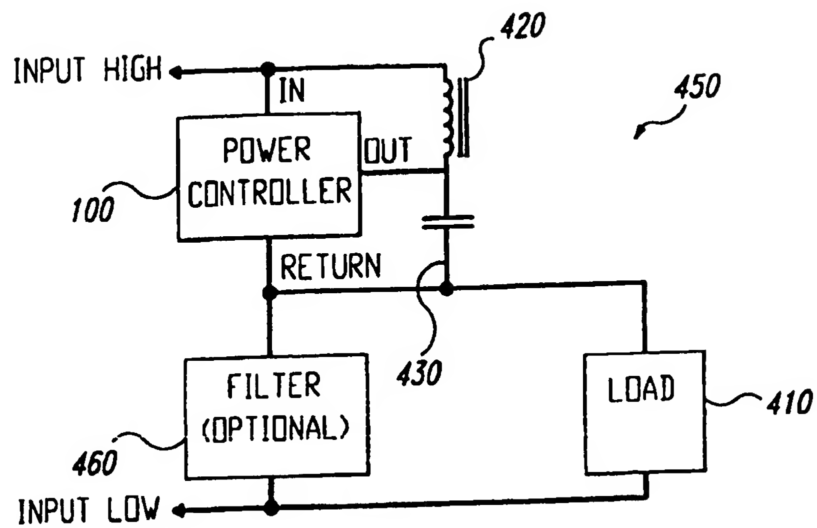

420
450
INPUT HIGH
IN
POWER
CONTROLLER
OUT
100
RETURN
430
FILTER
(OPTIONAL)
460
INPUT LOW
LOAD
410

Fig. 25

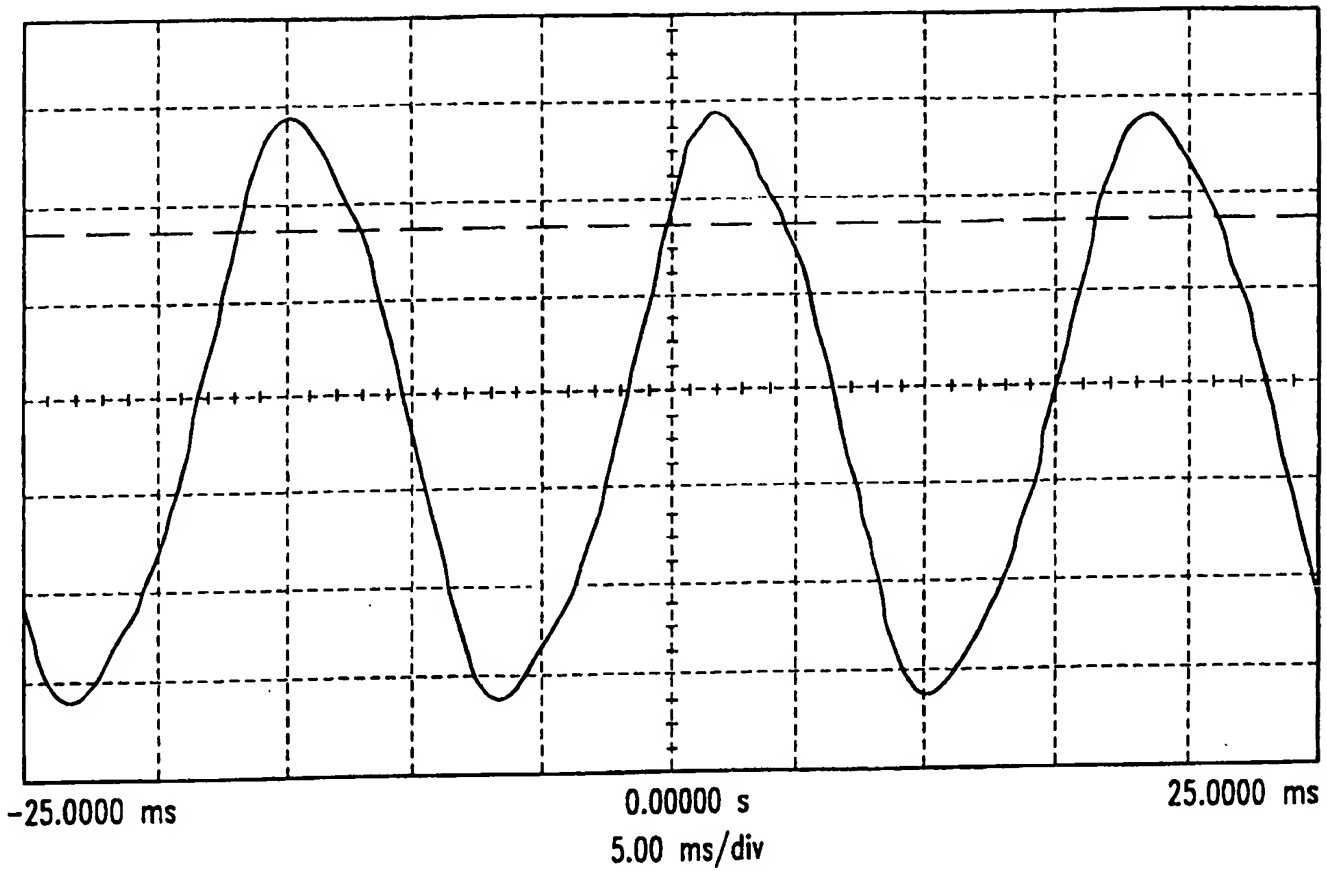


Fig. 26A

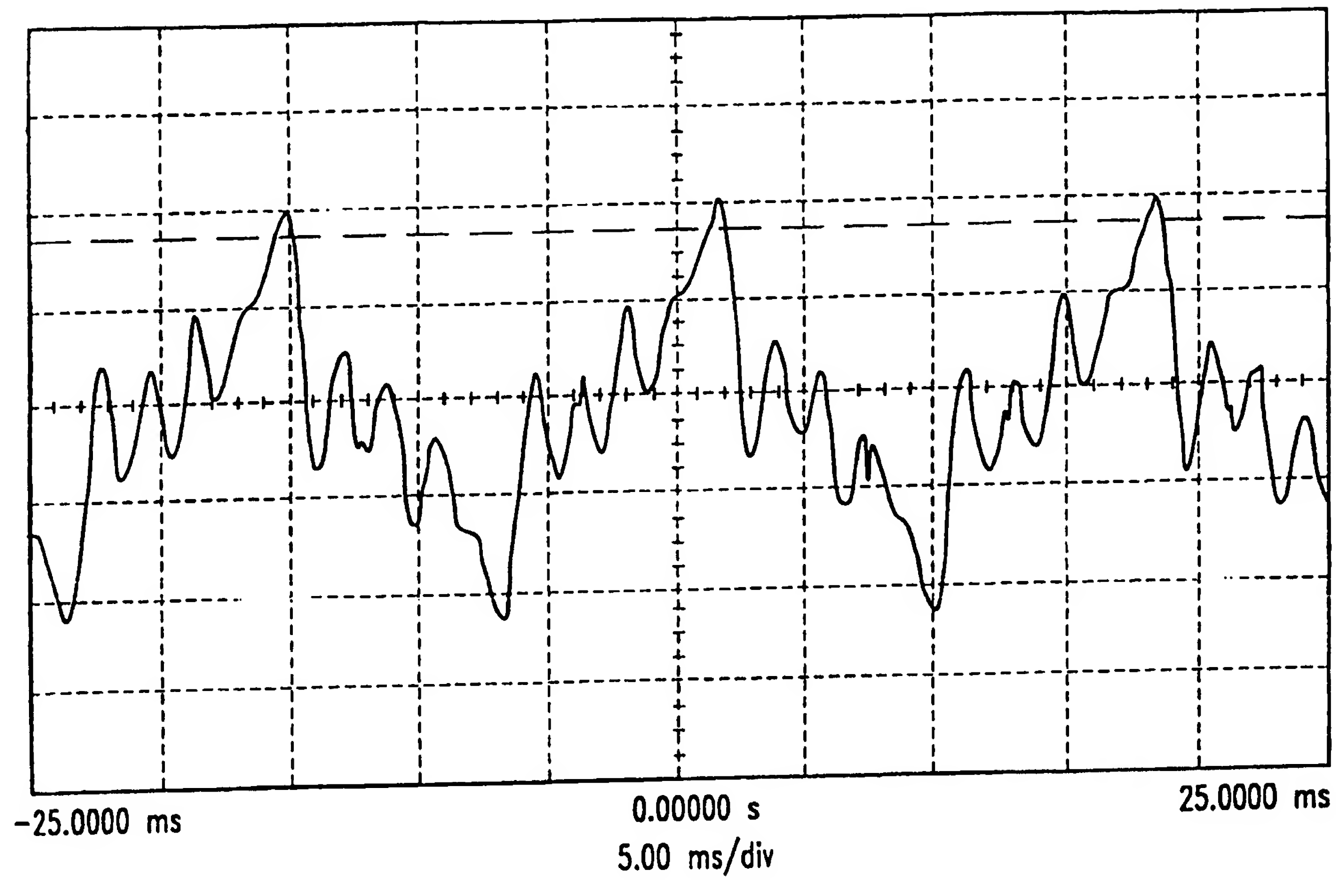


Fig. 26B

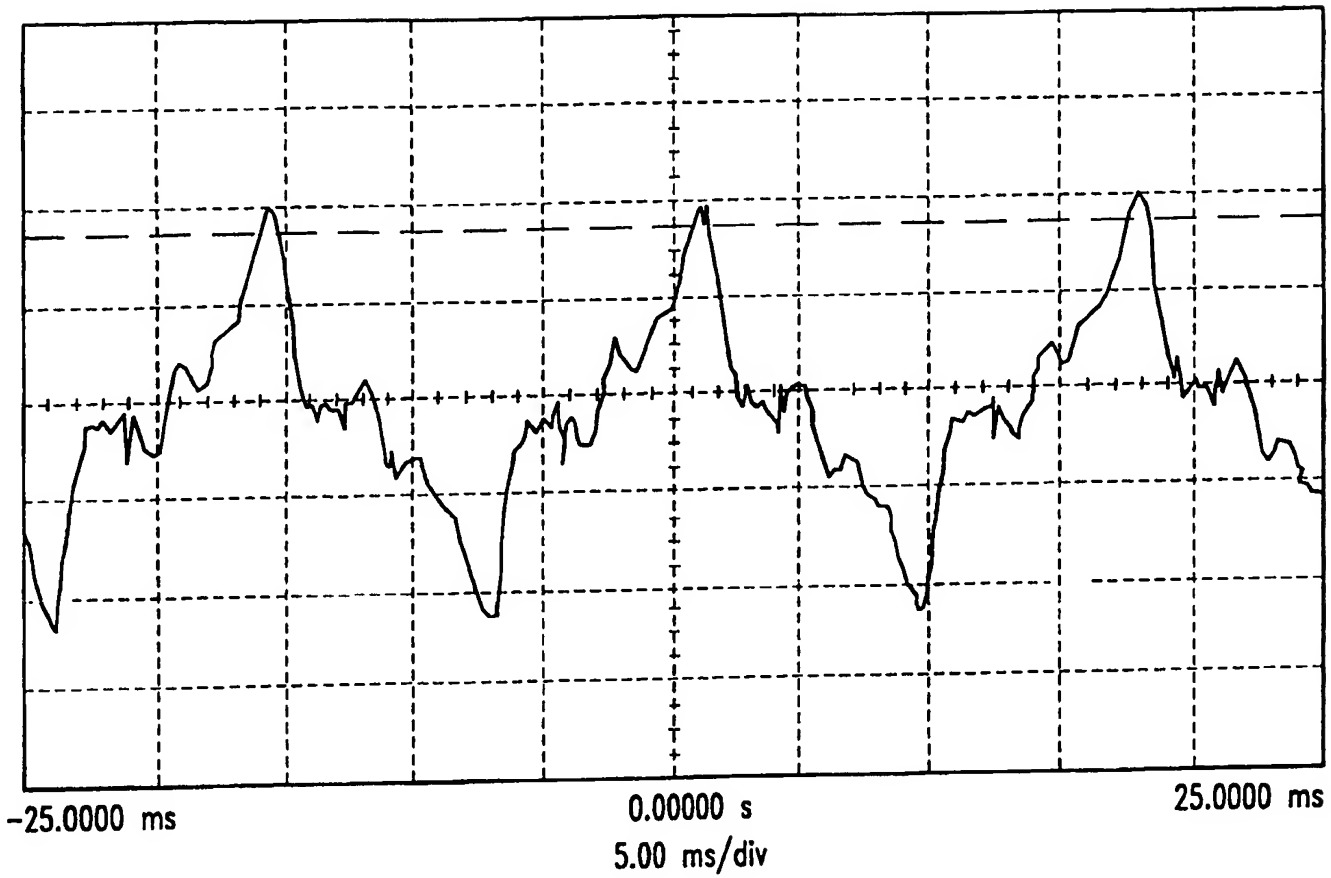


Fig. 26C

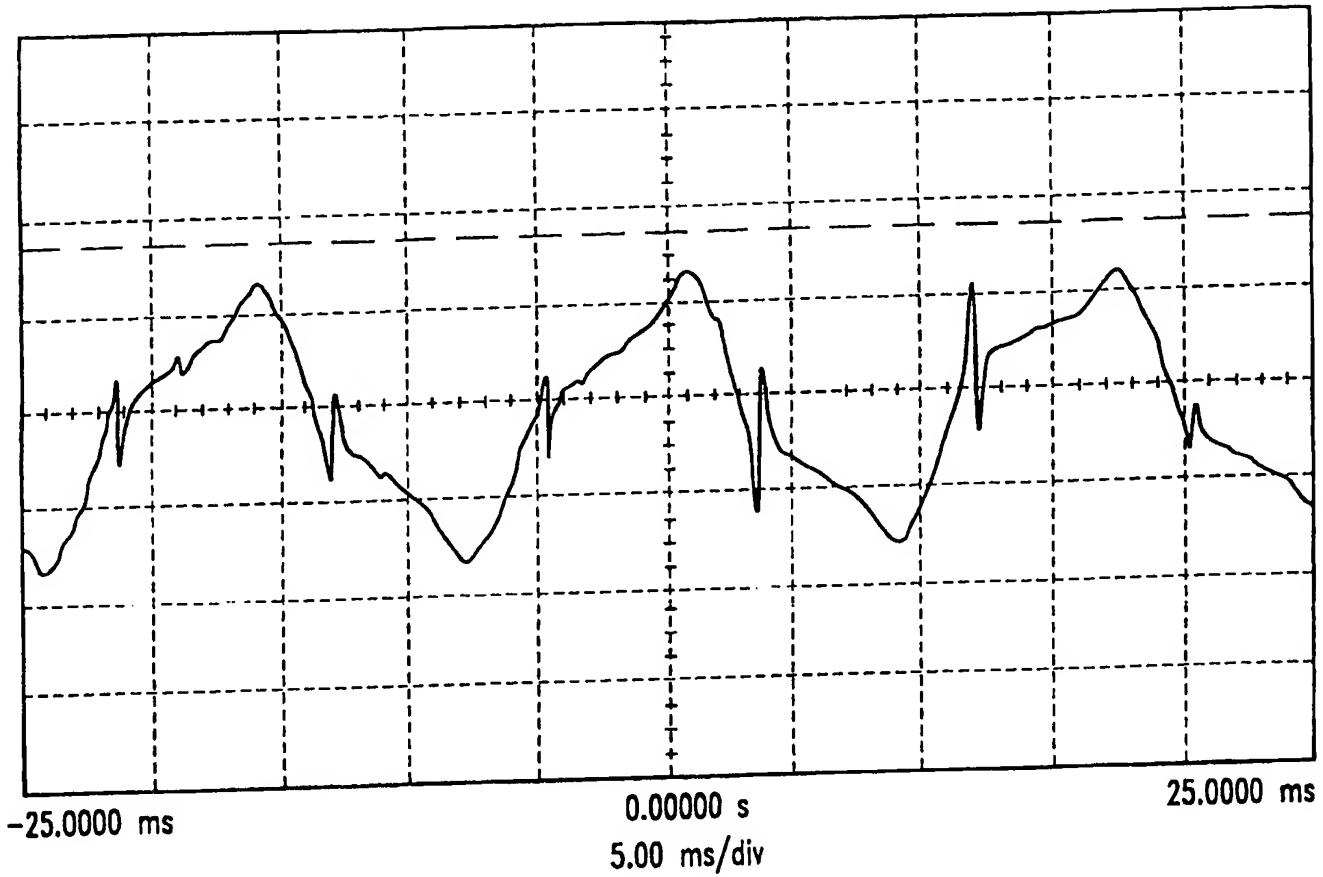


Fig. 26D

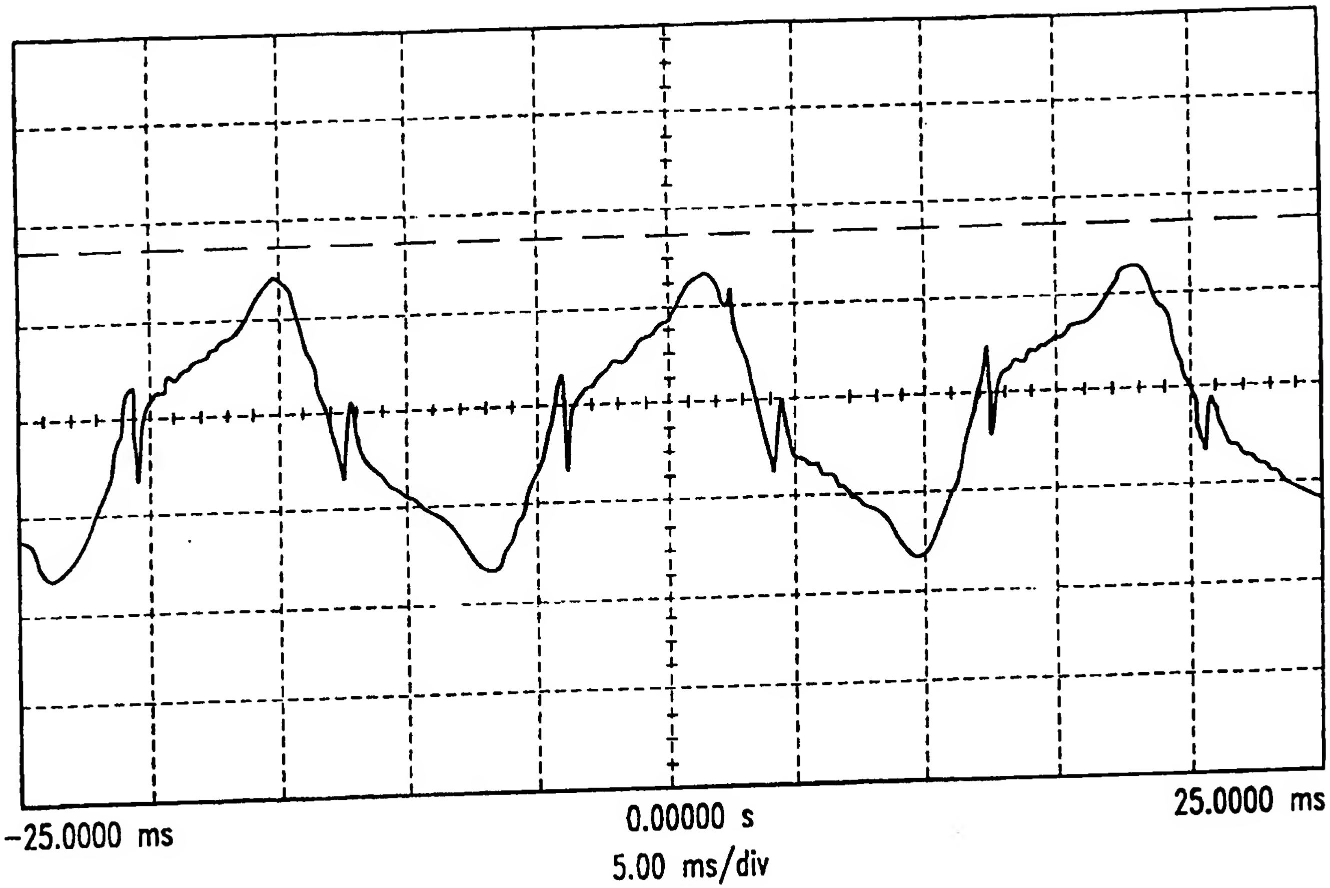


Fig. 26E

Fig. 27

120			Buck Mode MPC								
					Input				Output		
V AC rms	% of range	KW Eff	KVA Eff	KW	KVA	FF	%THD-rmsA	KW	KVA	FF	%THD-rmsA
120	100%	95.92%	94.00%	4.9	5	0.97	3.8	4.7	4.7	1	1.85
108	90%	95.65%	91.67%	4.6	4.8	0.97	4	4.4	4.4	1	1.85
96	80%	94.74%	92.31%	3.8	3.9	0.97	4.2	3.6	3.6	1	1.85
84	70%	93.75%	90.91%	3.2	3.3	0.96	4.7	3	3	1	1.9
72	60%	92.31%	88.89%	2.6	2.7	0.95	5.5	2.4	2.4	1	1.9
60	50%	89.00%	80.91%	2	2.2	0.93	6.5	1.78	1.78	1	1.95
48	40%	85.71%	76.36%	1.47	1.65	0.89	8	1.26	1.26	1	2
36	30%	82.65%	66.94%	0.98	1.21	0.81	10.3	0.81	0.81	1	2.2
24	20%	74.58%	48.89%	0.59	0.9	0.65	13.2	0.44	0.44	1	2.3
12	10%	53.45%	21.53%	0.29	0.72	0.4	15.8	0.155	0.155	1	3.4
0	0%	0.00%	0.00%	0.1	0.66	0.15	16.7	0	0	0.85	

			SCR								
					Input				Output		
V AC rms	% of range	KW Eff	KVA Eff	KW	KVA	FF	%THD-rmsA	KW	KVA	FF	%THD-rmsA
120	100%	98.04%	98.04%	5.1	5.1	0.99	12.4	5	5	0.99	11.5
108	90%	97.87%	98.00%	4.7	5	0.94	27.9	4.6	4.9	0.94	27.7
96	80%	97.44%	97.87%	3.9	4.7	0.84	42.5	3.8	4.6	0.83	42.9
84	70%	96.88%	97.67%	3.2	4.3	0.73	52.7	3.1	4.2	0.73	52.7
72	60%	96.15%	97.50%	2.6	4	0.63	60.3	2.5	3.9	0.63	60.2
60	50%	94.74%	97.22%	1.9	3.6	0.54	66.4	1.8	3.5	0.52	66.5
48	40%	92.86%	96.88%	1.4	3.2	0.43	72.1	1.3	3.1	0.42	72.4
36	30%	100.00%	96.43%	0.9	2.8	0.34	77.5	0.9	2.7	0.32	77.9
24	20%	100.00%	100.00%	0.5	2.2	0.24	84.2	0.5	2.2	0.22	84.4
12	10%				Unstable			Unstable			
0	0%										

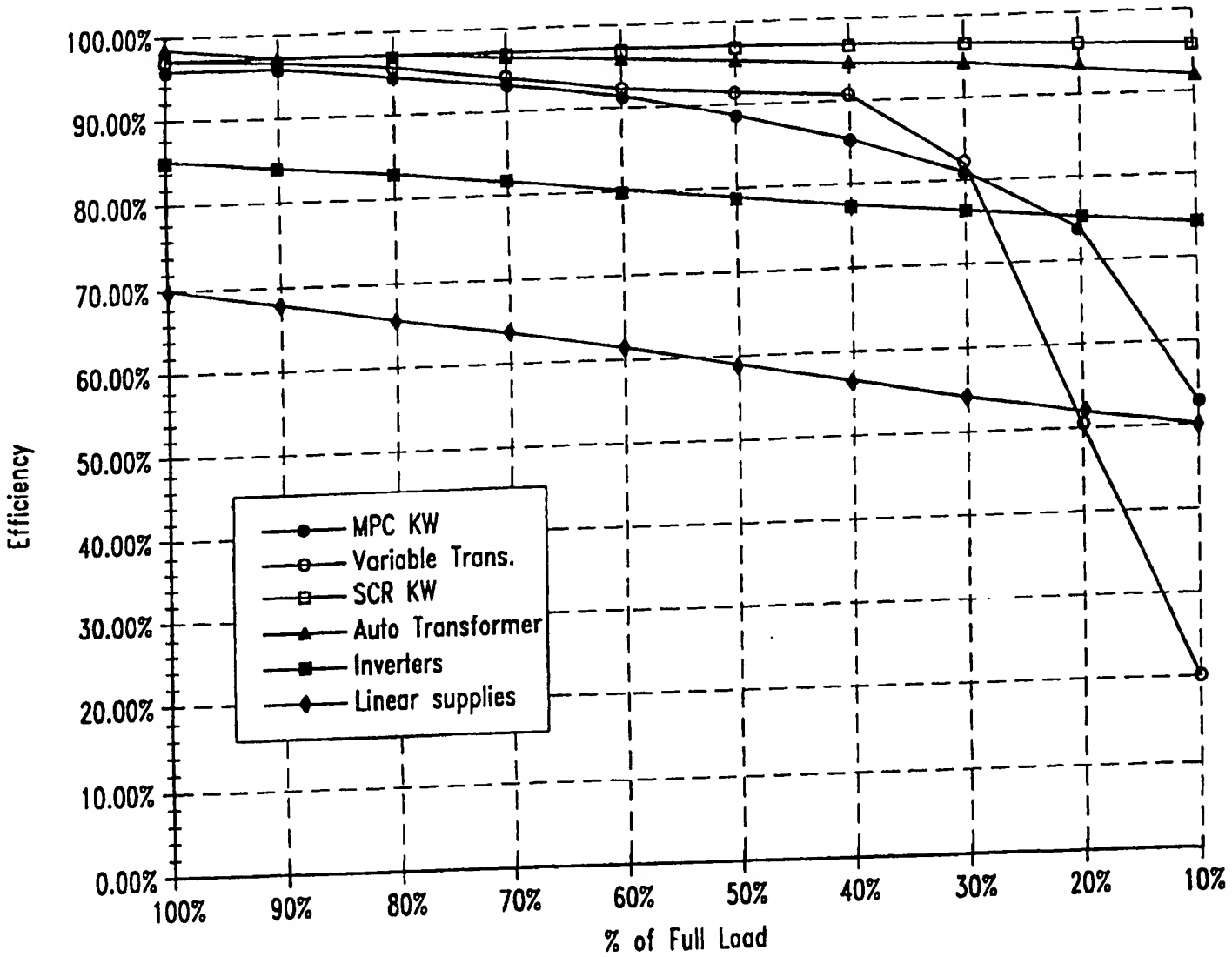

100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Efficiency
MPC KW
Variable Trans.
SCR KW
Auto Transformer
Inverters
Linear supplies
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
% of Full Load

Fig. 28

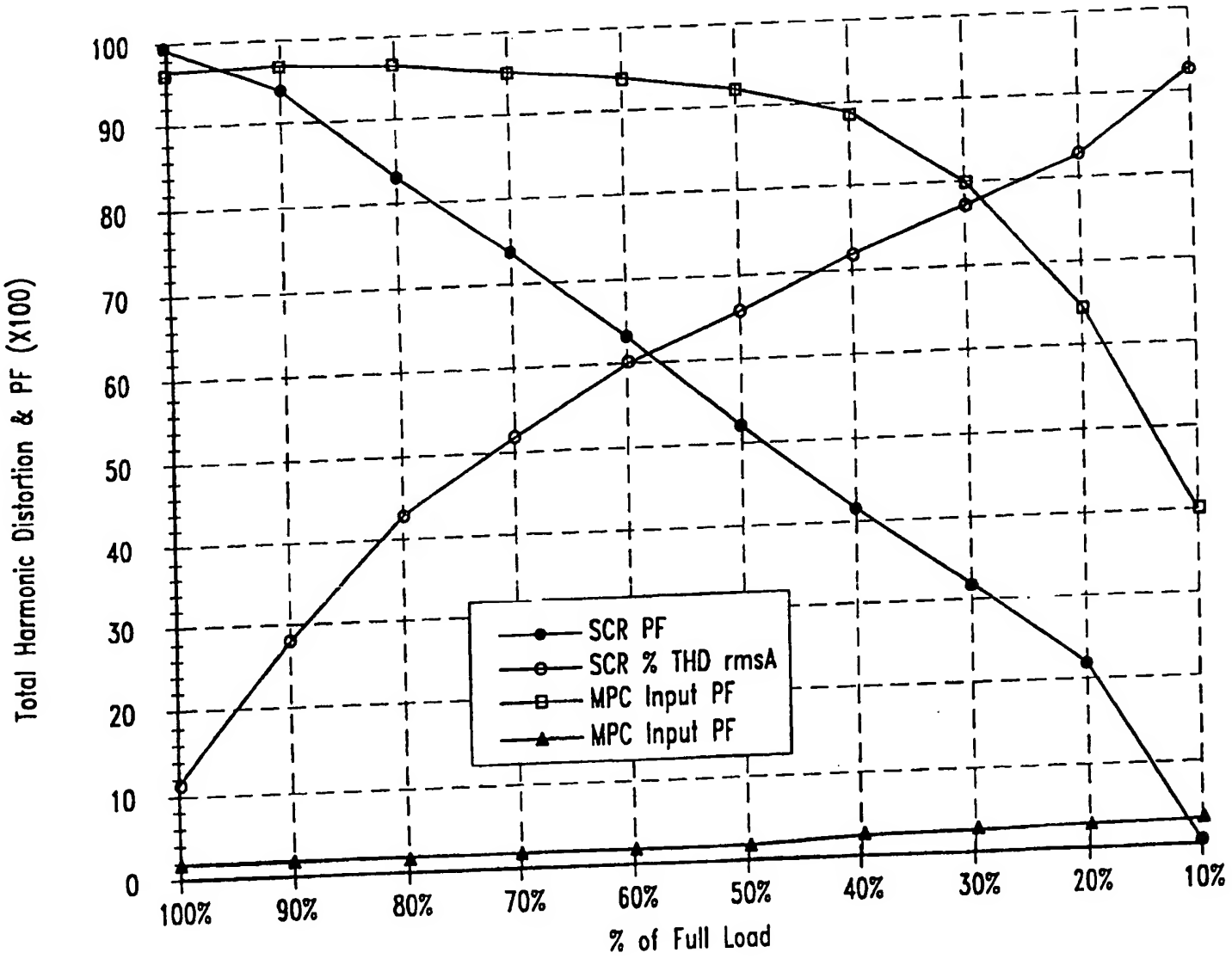

Total Harmonic Distortion & PF (X100)
100
90
80
70
60
50
40
30
20
10
0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
% of Full Load
SCR PF
SCR % THD rmsA
MPC Input PF
MPC Input PF

Fig. 29

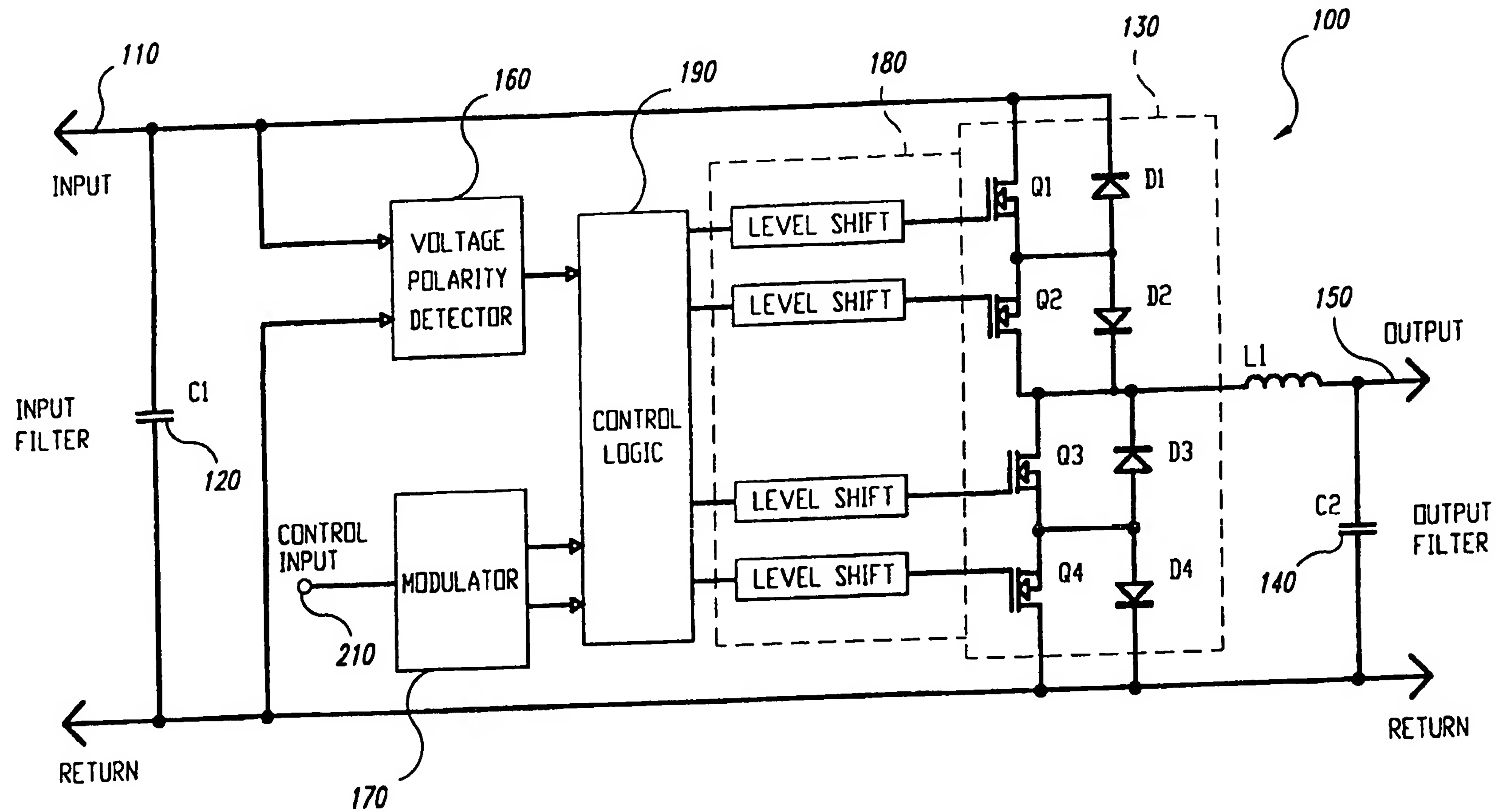

100
110
INPUT
INPUT
FILTER
C1
120
160
VOLTAGE
POLARITY
DETECTOR
190
CONTROL
LOGIC
180
LEVEL SHIFT
LEVEL SHIFT
LEVEL SHIFT
LEVEL SHIFT
130
Q1
Q2
Q3
Q4
D1
D2
D3
D4
L1
150
OUTPUT
C2
140
OUTPUT
FILTER
CONTROL
INPUT
210
MODULATOR
170
RETURN
RETURN

Fig. 30

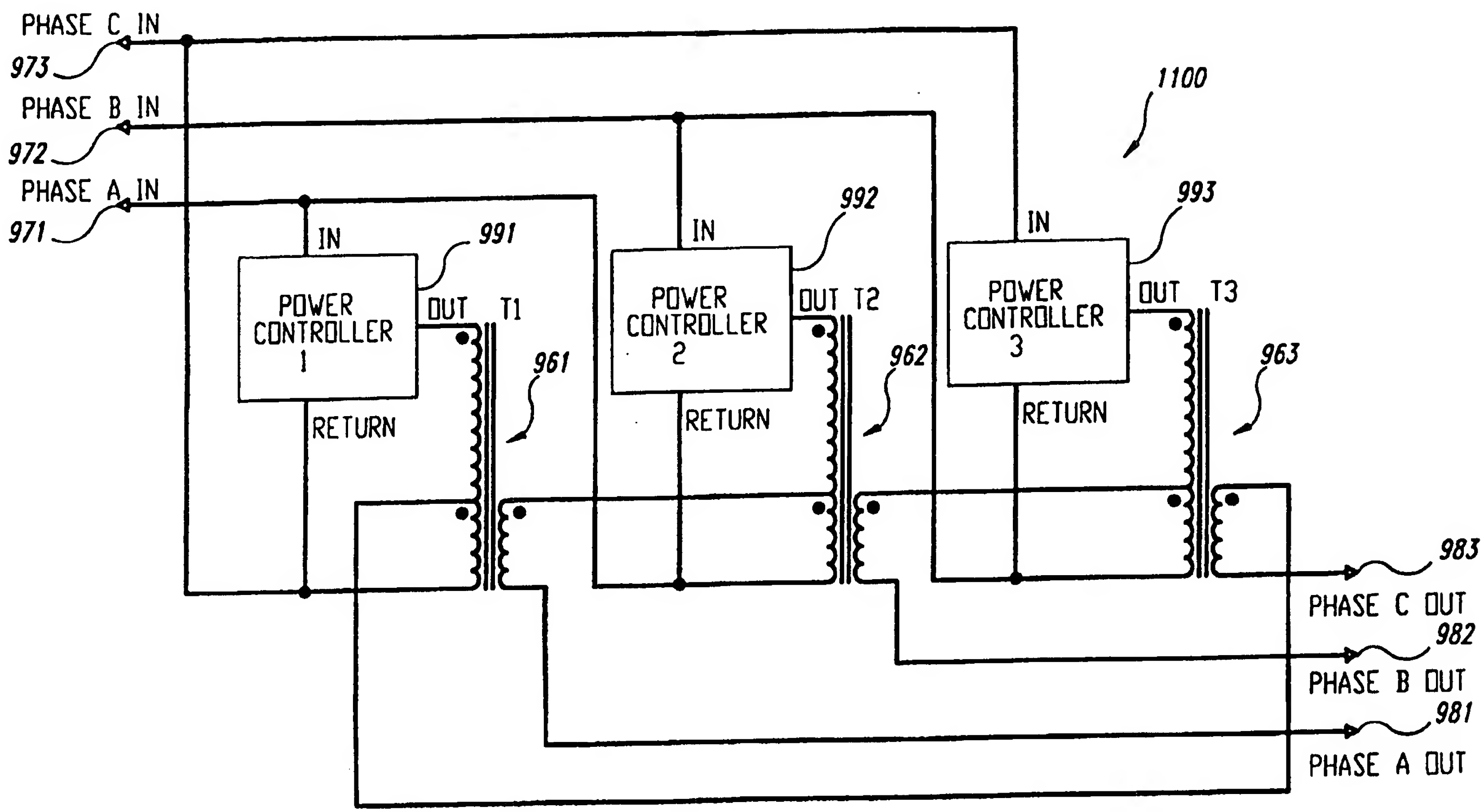

PHASE C IN
973
PHASE B IN
972
PHASE A IN
971
1100
IN
POWER CONTROLLER 1
991
OUT
T1
961
RETURN
IN
POWER CONTROLLER 2
992
OUT
T2
962
RETURN
IN
POWER CONTROLLER 3
993
OUT
T3
963
RETURN
983
PHASE C OUT
982
PHASE B OUT
981
PHASE A OUT

Fig. 31

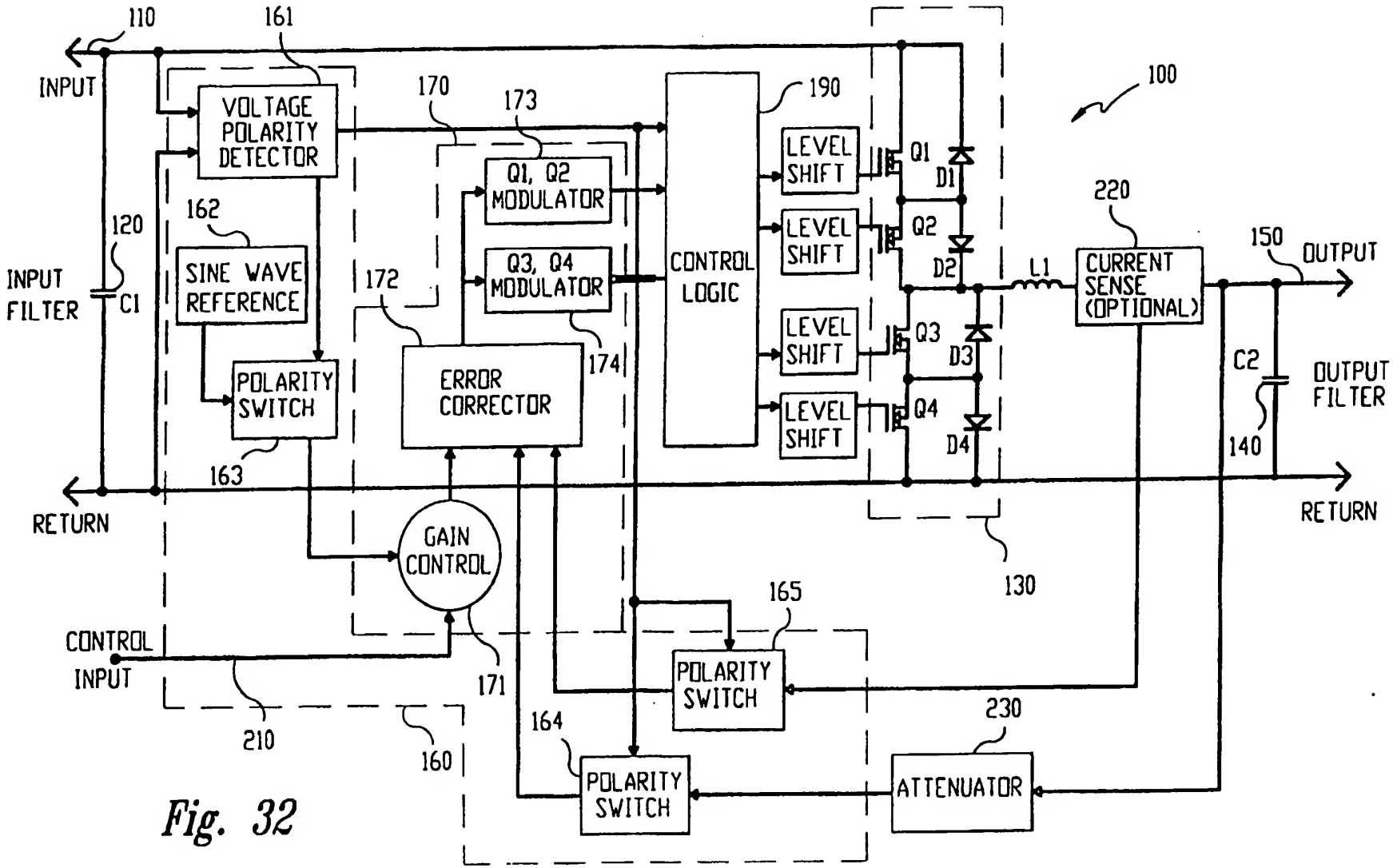

110
161
INPUT
VOLTAGE POLARITY DETECTOR
170
173
190
100
Q1, Q2 MODULATOR
LEVEL SHIFT
Q1
D1
220
162
120
Q2
D2
150
OUTPUT
INPUT FILTER
C1
SINE WAVE REFERENCE
Q3, Q4 MODULATOR
CONTROL LOGIC
LEVEL SHIFT
L1
CURRENT SENSE (OPTIONAL)
172
Q3
D3
C2
OUTPUT FILTER
POLARITY SWITCH
ERROR CORRECTOR
174
LEVEL SHIFT
Q4
D4
140
163
RETURN
RETURN
GAIN CONTROL
130
165
CONTROL INPUT
171
POLARITY SWITCH
230
210
160
164
POLARITY SWITCH
ATTENUATOR

Fig. 32

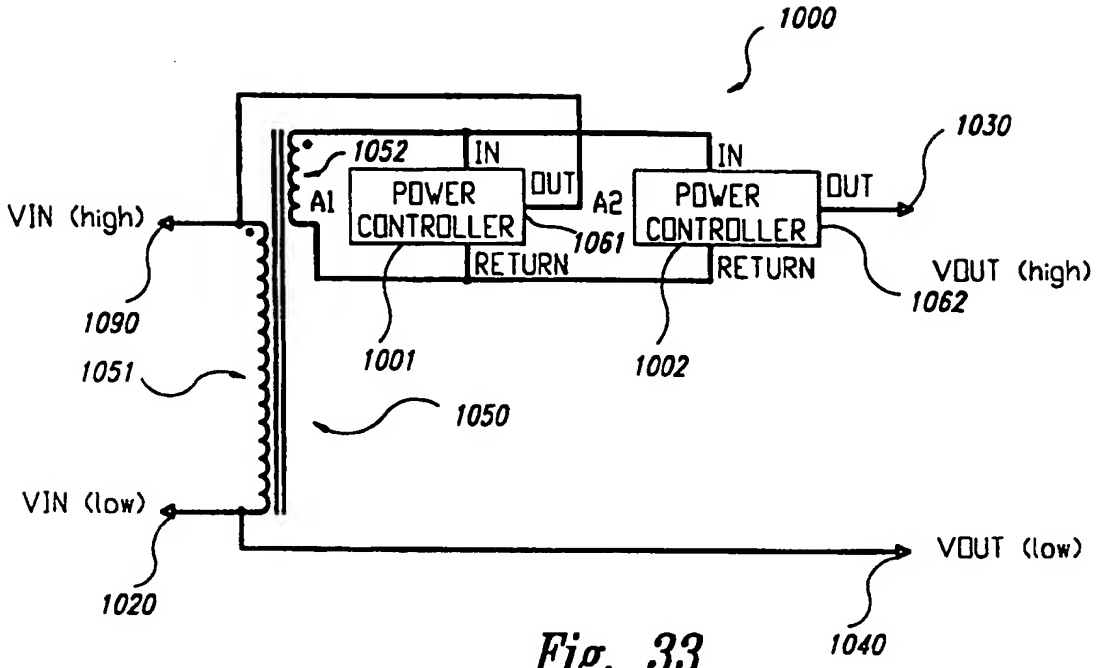

1000
1030
1052
IN
IN
A1
POWER CONTROLLER
OUT
A2
POWER CONTROLLER
OUT
VIN (high)
1061
RETURN
RETURN
VOUT (high)
1062
1090
1001
1002
1051
1050
VIN (low)
VOUT (low)
1020
1040

Fig. 33

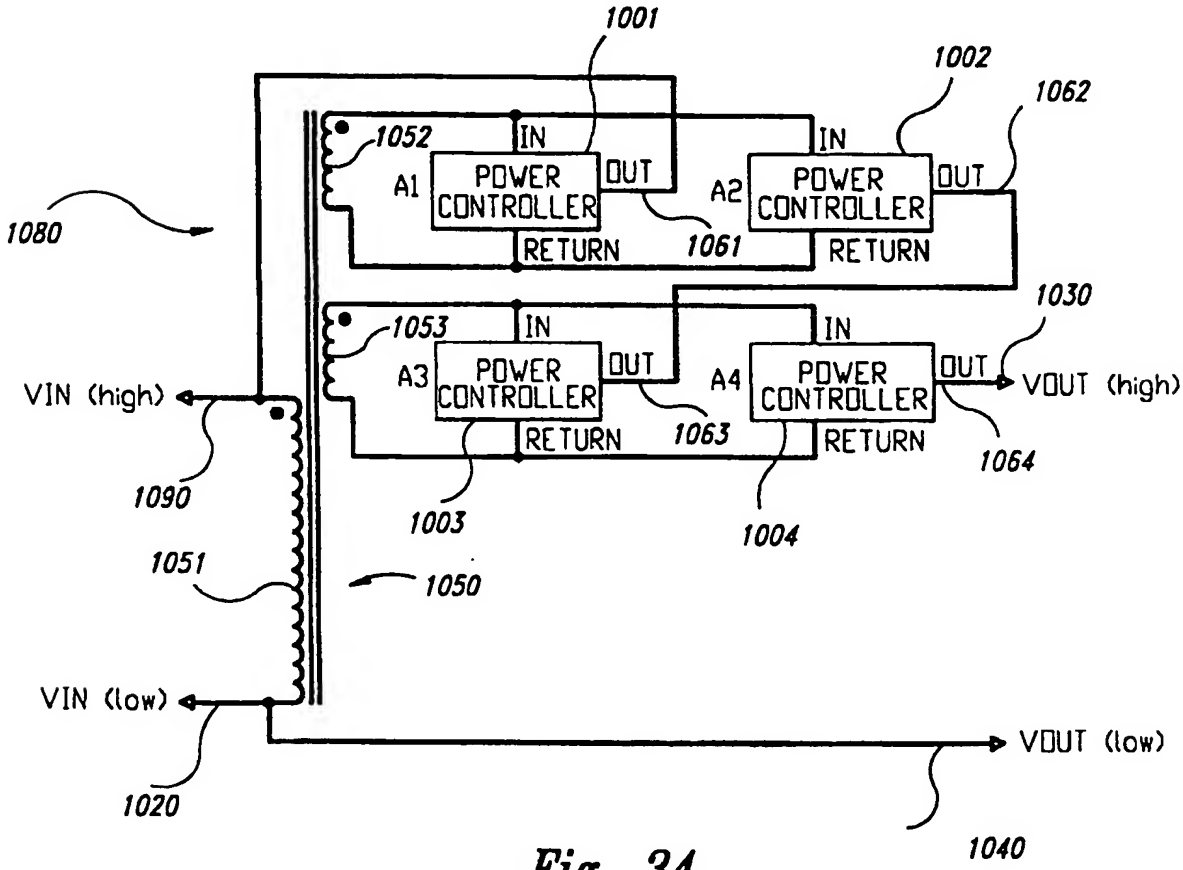
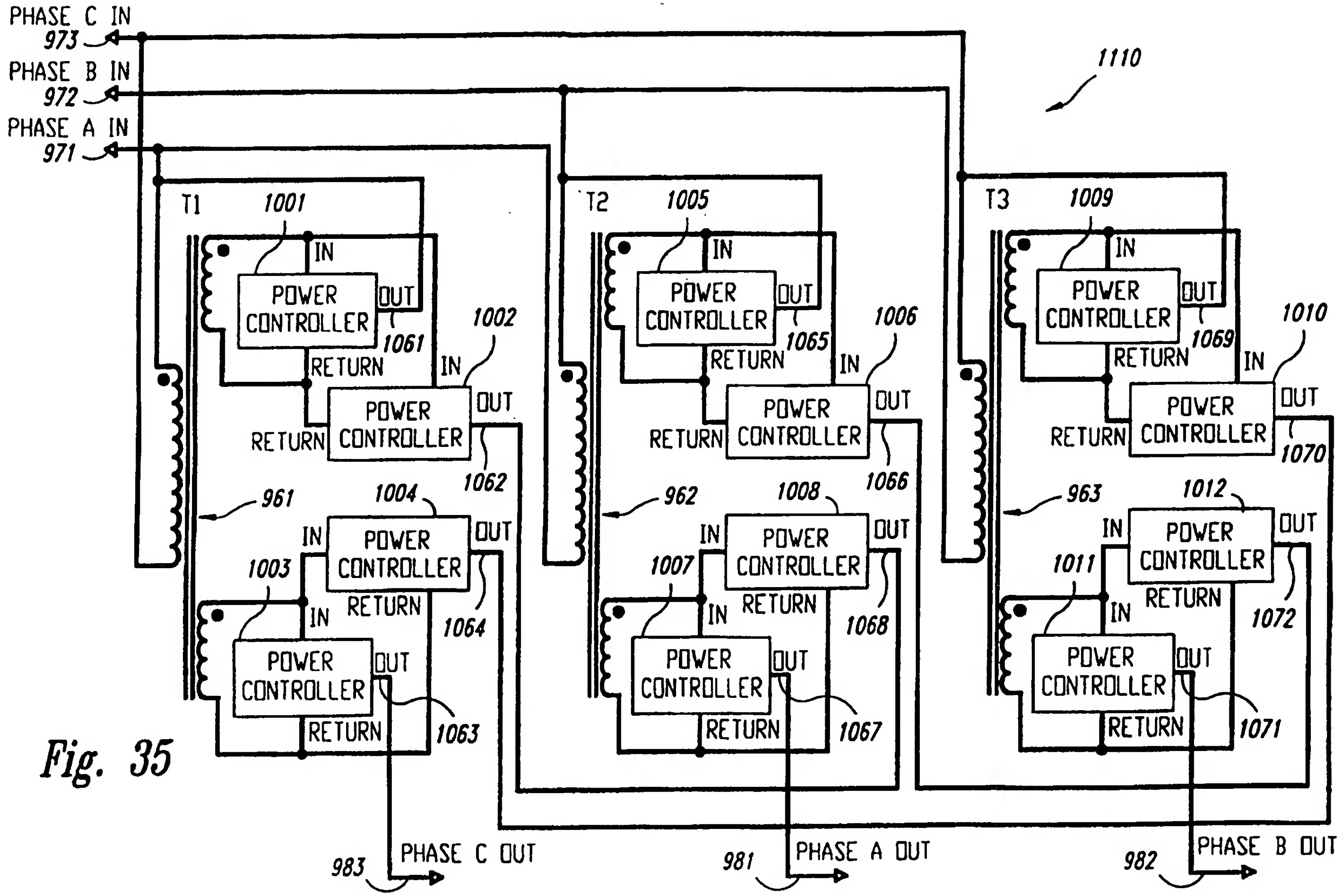

1001
1002
1062
1052
IN
IN
A1
POWER CONTROLLER
OUT
A2
POWER CONTROLLER
OUT
1080
RETURN
1061
RETURN
1030
1053
IN
IN
A3
POWER CONTROLLER
OUT
A4
POWER CONTROLLER
OUT
VOUT (high)
VIN (high)
1063
RETURN
RETURN
1064
1090
1003
1004
1051
1050
VIN (low)
VOUT (low)
1020
1040

Fig. 34



PHASE C IN
973
PHASE B IN
972
PHASE A IN
971
1110
T1
T2
T3
1001
1002
1003
1004
1005
1006
1007
1008
1009
1010
1011
1012
POWER CONTROLLER
IN
OUT
RETURN
1061
1062
1063
1064
1065
1066
1067
1068
1069
1070
1071
1072
961
962
963
983
PHASE C OUT
981
PHASE A OUT
982
PHASE B OUT

Fig. 35